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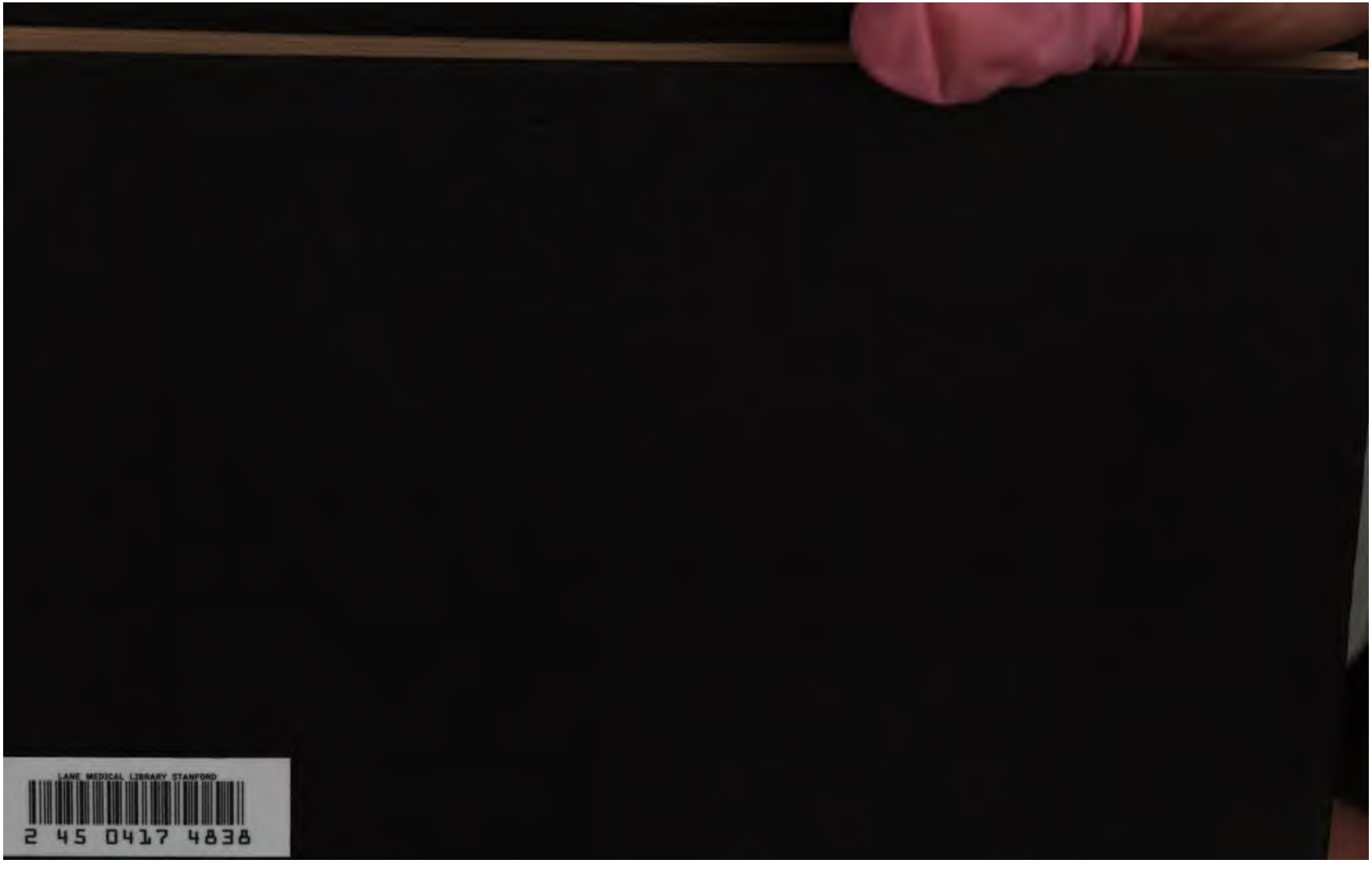
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(SIXTH BIENNIAL)

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF NEW HAMPSHIRE

FOR THE TWO YEARS ENDING NOVEMBER 1, 1906

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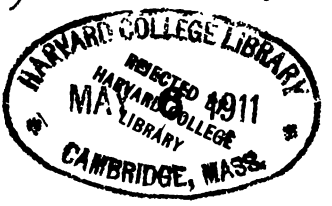

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STATE OF NEW HAMPSHIRE.

OFFICE OF THE STATE BOARD OF HEALTH,
STATE HOUSE, November 1, 1906.

To His Excellency the Governor and the Honorable Council:

I have the honor to present herewith the nineteenth report of the State Board of Health.

Respectfully submitted,

Irving A. Watson

Secretary.

REPORT.

The work of the State Board of Health increases from year to year owing, first, to the fact that each successive Legislature enacts laws that add very materially to its duties, and, secondly, to a greater and more widely spread appreciation of its services by local boards of health and the public generally.

It is impossible in a biennial report, that must be limited in size, to report all of the labors of the board for the period included. We are, therefore, obliged to exclude much interesting and instructive matter. In this category may be included, as more prominent, a constant and somewhat voluminous correspondence upon a great variety of subjects, upon which advice or suggestions have been given, particularly in relation to the management of infectious and contagious diseases; the sewering and draining of towns; details relating to the collection of vital statistics, and the executive control of the indigent insane and those legally entitled to state aid.

In this report will be shown, principally, the large amount of work done at the State Laboratory of Hygiene on public and private water supplies; the action of the board in connection with certain supplies; the extensive investigations of foods, drugs, liquors, etc., together with some special papers relating to the restriction and prevention of certain diseases, and to other matters.

Local Boards of Health.

The local boards of health have never before been so efficient, probably, nor so well organized as at the present time. It is but a few years since, in some localities, a board of health was considered practically useless, and, indeed, perhaps it was as then constituted; but there has been a growing recognition of what may be accomplished under certain circumstances in any town with an efficient board of health, so that at the present time such boards are recognized as having an equal standing with the board of selectmen and the board of education. Formerly the idea prevailed that a local board of health was the servant of the board of selectmen, and that they could undertake no work that involved the outlay of a dollar without the permission of the selectmen. Boards of health have come to a knowledge of the fact that they are an independent board, absolutely, and not under the dictation of any other local authority. The recognition of this fact has led to the appointment in the last few years of good men in most instances upon the board of health, with a corresponding increased efficiency.

It has been the aim of the State Board of Health to assist local boards of health as far as possible, by giving information and advice concerning their duties in the management of any case in which counsel was sought.

We believe that the increased efficiency of local boards of health is already manifest to a large extent in this state in the control of some of the contagious and infectious diseases, and this is evident in the mortality rates as shown in the registration reports.

Local boards of health, under authority conferred by the Public Statutes, as well as under common law, have practically unlimited power in the reasonable management of any condition likely to jeopardize public health interests, except in the construction of public works. Such boards should, therefore, be composed of the best citizens of the town, and should regard their office as one carrying with it a large degree of responsibility. The progress that has been made along these lines is exceedingly gratifying.

Health Officers to be Appointed, not Elected.

Notwithstanding that the law providing for the election of health officers at the annual town meeting was repealed in 1897, a few towns have, even at the last election, elected boards of health.

Such action on the part of the town is invalid, and a board of health so chosen has no official status. The few towns that have taken this illegal action have been notified of their error, which was discovered by this board in requesting of the town clerks a full list of their health officers, with dates of appointment.

This list, so far as it could be perfected, is given elsewhere in this report.

The attention of boards of selectmen is called to the law relating to the appointment of health officers. Chapter 45, section 1, Laws of 1897, as amended in 1899, reads as follows:

> The selectmen of each town shall, within thirty days after the passage of this act, appoint a board of health, which shall consist of three persons, selected with reference to their fitness for the office, and they shall be so appointed that the term of office of one member shall expire each year, and the members thereafter appointed shall hold office three years, and until their successors are appointed and qualified. In case a vacancy occurs in the board, the selectmen shall appoint a person to fill the unexpired term. Whenever practicable, at least one member of the board so appointed shall be a physican, who is a graduate of some legally incorporated medical college and in active practice in said town.

Boards of Selectmen Cannot Discharge Health Officers.

It has happened very rarely, we are pleased to say, that a difference of opinion has arisen between the board of selectmen and the board of health of a town and the situation become so strained that the selectmen have threatened to discharge from office a member of the board of health.

Recently, in one town in the state, the feeling reached a point that the board of selectmen sent a written notice to two members of the board of health discharging them from office. Upon investigation by the State Board of Health, it appeared that the board of health had incurred the hostility of the board of selectmen in the performance of their duties as health officers. The State Board of Health refused to recognize the action of the selectmen as valid, and so notified them. The chairman of the latter board declined to accept the opinion of the State Board of Health in the matter, and the case was referred to the attorney-general. Following is the correspondence on the subject:

CONCORD, N. H., September 5, 1906.

Hon. E. G. Eastman, Attorney-General, Exeter, N. H.:

DEAR SIR: For the purposes of this board we would respectfully ask your opinion on the following question: Has a board of selectmen authority to discharge from office a member of the local board of health?

Respectfully submitted,

(Signed) IRVING A. WATSON,
Secretary.

THE STATE OF NEW HAMPSHIRE.

ATTORNEY-GENERAL'S OFFICE,
EXETER, October 6, 1906.

Dr. Irving A. Watson, Secretary State Board of Health, Concord, N. H.:

DEAR SIR: Pursuant to your inquiry respecting the power of the selectmen of a town to remove the board, or any person who is a member of a town board of health for any town, I will say that, in my opinion, the selectmen have no such authority in the absence of a statute granting it.

Under the law of this state, the term of office for members of a town board of health is prescribed by a special statute, and there is no statute which confers upon selectmen the right of removal during such term,

Respectfully submitted,

(Signed) EDWIN G. EASTMAN,
Attorney-General.

The opinion needs no comment, and is given solely for the pnrpose of giving information to local officials.

THE SANITARY BULLETIN.

The *Sanitary Bulletin* has been issued quarterly since January, 1900, being a medium which brings the State Board of Health into closer relations with local boards of health and the public, in that it contains instructions and advice upon such matters as the board deems to be of public health interest and importance.

The *Bulletin* is sent regularly to physicians, to members of local boards of health, to retail grocers of the state, and to many individuals. It is circulated in every town in New Hampshire, and, by reason of the very

complimentary reviews by the press throughout the country, a demand has come from outside of New Hampshire that is fast reaching such proportions that will compel the board to refuse such solicitations unless some special provision can be made to meet it. The feature that has attracted especial attention during the last two years is the reports upon food supplies, showing not only the adulterated articles that have been found, but also those that have stood the test of critical examination, the latter of which are not represented in this report.

Five thousand copies of the *Bulletin* are published regularly, with the exception of an occasional issue for more general distribution, when the number has reached 10,000 copies.

Commission of Lunacy.

By an act of the Legislature the State Board of Health was made to constitute a State Board of Commissioners of Lunacy, being given authority at the time of the act to transfer certain insane persons to the New Hampshire State Hospital for remedial treatment, and, also, to investigate the condition of the insane at the several county institutions.

In 1903 the board was authorized to transfer insane persons from the county asylums and almshouses, *pro rata* by counties, to the New Hampshire State Hospital as fast as accommodations could be furnished. At the time of the last report approximately 250 patients were receiving remedial treatment at the expense of the state, by order of the board.

In January, 1905, under the act referred to, 156 patients were permanently transferred from the several counties to the State Hospital. The new buildings, which are now nearly completed, will probably be ready to receive another lot of county patients in January or February, 1907.

The new buildings will not be sufficient to take care of all the county insane, therefore it is evident that other buildings will have to be erected to carry out the full intention of the law. It may be interesting to state in this connection (although the facts are more fully shown in another report to the Legislature) that under date of October 1, 1906, there were, according to the returns of the various superintendents, 875 insane persons in the custody of the several institutions, 668 being at the New Hampshire State Hospital, and 207 at the several county almshouses and asylums. At the present time there are no insane persons at the Strafford County and the Belknap County asylums.

Vital Statistics.

In the regular report upon this subject will be found a full statement of the number of births, marriages, divorces and deaths returned during the past two years, so grouped as to give such information as is usually sought concerning matters connected with the movement of the population.

The Registration reports, which have been continued now for twenty-five years, constitute the only information that we have as a guide to sanitary work, to the increase of population, and to questions relating to marriage and divorce, so that, in fact, they are the foundation of all definite knowledge along these lines.

The report is not in any sense a readable volume, but is a reference work for those who are in search of such facts as its contains. From the figures thus available it is seen that the number of births, marriages, divorces and deaths for the years 1904 and 1905 was as follows:

	1904.	1905.	Increase.	Decrease.
Births	8,364	8,782	418	.....
Marriages	3.803	4,212	409	.....
Divorces	525	471	.....	54
Deaths	6,804	7,339	535	.....

The figures give a death rate of 17.07 per each 1,000 of the estimated population for the year 1905. This rate is slightly lower than the average for the past twenty-two years, although somewhat higher than that for the last four years.

While there has been a marked reduction in the mortality from some of the communicable diseases during the period covered by the Rgistration reports, there has been, on the other hand, a large increase in some of the diseases of the nervous, circulatory and respiratory systems.

In the following table is given the number of deaths from the principal so-called communicable diseases for the years 1904 and 1905:

Diseases.	1904.	1905.	Increase.	Decrease.
Pneumonia	635	690	55	.....
Tuberculosis (consumption)	575	571	.....	4
Diarrhœa and enteritis (cholera infantum)	321	392	71	.....
Diphtheria	43	60	17	.....
Croup	25	17	.....	8
Typhoid fever	76	56	.....	20
Influenza	71	98	27	.....
Scarlet fever	9	2	.....	7
Whooping cough	13	30	17	.....
Measles	3	24	21	.....
Smallpox	2	None	.....	2

For many years consumption ranked first in the causes of death, but within the last few years it has taken a second place in the list, giving precedence to pneumonia. The deaths from consumption vary only slightly in the two years reported, and is approximately the same as reported for the preceding two years—a much lower number than formerly. In 1884, the year of the first reliable registration figures, there

were 868 deaths from consumption in New Hampshire. In all the diseases given in the table the figures are much lower than formerly, showing the results of sanitary work and a better supervision of contagious diseases by local boards of health.

The number of deaths from typhoid fever in 1905, to wit, 56, was much lower than ever before returned. The very small number of deaths reported for both years from scarlet fever must be due largely to the efforts made for the restriction and prevention of this disease. The mortality from whooping cough and measles was sufficiently large to attract the attention of health officers and to raise the question whether or not more efficient means for the restriction and prevention of these diseases should not be inaugurated.

From diphtheria and croup (laryngeal diphtheria), there were 68 deaths returned in 1904 and 77 in 1905. The distribution of this disease depends upon so many factors, often beyond control, that the mortality from it fluctuates more or less from year to year, but was materially reduced for all the years since the introduction of antitoxin.

A pamphlet on the "Restriction and Prevention of Diphtheria" has been issued by this board for free distribution, especially in localities where the disease may be prevailing. It also gives instructions to health officers on the management of the disease.

Cholera infantum, so called formerly, but now in nosological classification given as "diarrhœa and enteritis," is still a source of a large infant mortality, due chiefly, and perhaps almost entirely, to improper feeding and unsanitary environments.

There is a fluctuating mortality from influenza (la grippe). The first epidemic of this disease for many years commenced in 1890, reaching a mortality in 1892 of 331 in this state. Since that time its ravages have varied considerably from year to year, the number of deaths in 1905 being 98, the largest number returned since 1901.

As against the reduction in the total number of deaths from general diseases, it should be noticed that the death rate from all diseases has not been materially reduced, owing to the large increase from certain other causes. In fifteen years the annual number of deaths from apoplexy has more than doubled in New Hampshire, reaching a total of 453 in 1905. Meningitis has also increased to a marked degree, there being in the last year (1905), 352 deaths from this cause, while cancer has increased in a very steady ratio to a total, in 1905, of 344 deaths.

A more rapid increase is shown in Bright's disease, the decedents from this cause numbering 428 for the year 1905.

These facts open up serious problems for consideration.

Records of Births, Marriages, Divorces and Deaths.

There are now in the department of vital statistics, under the charge of the State Board of Health, a million or more records of births, marriages, divorces and deaths, covering (under an act of the last Legislature) the entire period from the earliest settlement of the state to the present time. The act referred to is as follows:

Chapter 21, Laws of 1905.

AN ACT to perfect the records of births, marriages and deaths.

Be it enacted by the Senate and House of Representatives in General Court convened:

Section 1. As soon as practicable after the passage of this act the registrar of vital statistics shall ascertain from what towns and for what years returns of births, marriages, and deaths were not made to the state, or are not to be found among the archives of the department of vital statistics, and shall convey this information to the clerks of such towns, together with suitable blanks upon which to make returns.

Sect. 2. It shall be the duty of the town clerk to transcribe in full upon said blanks all records of births, marriages, and deaths in the possession of the town not already returned, and to transmit the same, properly certified, to the department of vital statistics within such reasonable time as may be allowed by the registrar of vital statistics, and for such service the town clerk shall receive from the town the sum of five cents for each record so transcribed, certified and transmitted.

Sect. 3. All records returned to the department of vital statistics shall be so filed and indexed as to be made readily available for reference, and, when required for any legal purpose, the registrar of vital statistics shall furnish a certified copy, under seal of the department, free of expense.

Sect. 4. All acts and parts of acts not consistent with this act are hereby repealed, and this act shall take effect upon its passage.

Approved February 15, 1905.

In accordance with the above law, instruction was promptly given to the clerks of the several towns and cities of the state to make returns of all records of births, marriages and deaths possessed by the town from its earliest settlement down to the time when annual returns were made to the state. Explicit instructions were given that every record book must be searched, and the earlier ones read carefully, page by page, to obtain all of the records.

The work is now nearly completed for the entire state, more than 400,000 having already been returned under this law. All of the records in the department are upon cards and filed under family names, with a system which makes any record immediately accessible.

This great mass of records, now exceeding a million, has been accumulated during a period of a little over fifty years, and has cost the towns

and the state a very large sum of money. They are proving of great value in determining many questions in which evidence could not be otherwise obtained—in pension cases, legal matters, etc.,—besides being extensively sought in the study of family histories, in the eligibility of persons for membership in patriotic societies and orders, and for other purposes. They are being almost constantly consulted, and many records have been found that are not in existence elsewhere, for the reason that since these returns were made to the state quite a number of local record books have been destroyed by fire or otherwise lost.

Attention is called to the fact that this very important collection of records, representing a vast deal of labor and a large expenditure, is wholly unprotected from fire. Some provision should be made whereby these records may be placed in a fire-proof building,—not stored in vaults, because they are so constantly consulted that this would be impracticable, but they should be in ample rooms, safe from fire.

The Pure Food Question.

We have shown elsewhere something of the work done along this line, but have no comment upon results. The policy of the board has been an educational one largely, in that it has endeavored to point out to the grocers of the state such articles as were found upon examination to be adulterated or illegal, as well as the brands that met the requirements of our law.

We have taken this course in the belief that a majority of our dealers are honest men and desirous of complying with the law. We believe that we have not been mistaken in this assumption. Our law, however, is defective, and does not admit of a rigid enforcement without doing an injustice to honest men, who may have purchased goods under false pretences, believing them to be legitimate.

It has been impossible to prevent the shipment of adulterated and misbranded goods into New Hampshire. It is true that the efforts of the board have resulted in the practical ruin of the business in New Hampshire of certain firms producing this class of goods, on account of the refusal of our dealers to purchase their products, by reason of the information given them of their character, so that, as a whole, much good has been accomplished.

We believe, however, that at the coming session of the Legislature the whole subject should be carefully considered, and that our food law should be so revised as to correspond as nearly as possible with the national pure food law. The latter, which goes into effect in part on January 1, 1907, and wholly on October 1, 1907, will be of immense advantage in exclud-

ing from the state adulterated and misbranded goods; but it will be necessary for the states to act in coöperation with the national government to carry the law into effect. That it will be of inestimable value to dealers and consumers there can be no question, provided it is supplemented by such state legislation as will make it generally effective.

Public and Private Water Supplies.

There is no one thing of greater vital importance to the health interests of a community or a family than its water supply. Recognizing this, the State Board of Health has, during the last few years, devoted a large amount of work to this subject.

In this report the results of laboratory examinations have been continued, being added to the previous tables, so as to show for as long a period as possible the actual condition of the waters examined. This is important in order to determine what fluctuations appear from time to time, as they do in certain instances.

It will be seen by reference to the summary in another part of this report that frequent chemical and bacteriological examinations have been made of these public supplies, and also of many private ones. In addition thereto, personal inspections have been made and advice given, in numerous instances, with a view to assisting in the solution of perplexing problems connected therewith. On some of these will be found special reports elsewhere in this volume. Upon petitions to the State Board of Health, special rules and regulations have been established to protect the water supplies of Alton and Lisbon, and also for the protection of Squam lakes against contamination.

During the period covered by this report 489 chemical and bacteriological examinations of public water supplies have been made, representing 98 water-works systems.

The demand for the examination of private supplies has been so great that we have been obliged to restrict this work to such sources as were suspected of being dangerously contaminated, or of being the cause of illness in the family using the supply. Notwithstanding this exacting regulation, 1,079 examinations of private supplies were made, with a result of finding 415 unfit for use; 142 doubtful; 183 samples that contained an excessive amount of lead, and two that were adversely reported upon on account of the large amount of zinc present.

This brief statement indicates something of the great amount of work that has been done during the past two years at the State Laboratory of Hygiene in the line of water analysis alone.

A detailed account of the work will be found in subsequent pages.

State Laboratory of Hygiene.

We believe that it has been most emphatically demonstrated to the people of the state that the State Laboratory of Hygiene is an indispensable branch of the public-health service. A partial record of its work, as exhibited in this report, shows its extensive investigations of our public water supplies, of food products, drugs, etc., and, further, of what is of special value to the physicians of the state and many of their patients, the examinations in suspected cases of tuberculosis, diphtheria, typhoid fever, etc.

In the food work, this report shows only a part of the investigations made, since it does not include those products that were found to meet the requirements of our law relative to the adulteration of foods, drugs, etc.

Considering the limited appropriation devoted to laboratory work, in comparison with the sums expended in some other states, we feel that we have reason to be proud of what has been accomplished. That a very large amount of work has been done, and work that is regarded as of great public importance, is a matter of record.

In the act creating the State License Commission is a provision which requires the State Laboratory of Hygiene to make examinations for the commission. Under its provisions there have been examined at the laboratory 483 samples of wines and distilled liquors, and 82 samples of malt liquors. The results of this work are given in detail elsewhere in this report.

The Chemical Department.

The work of the chemical department of the State Laboratory of Hygiene has been outlined in the foregoing remarks, and a somewhat extended account of its labors, although incomplete, is given elsewhere in this report.

The laboratory, itself, is fairly well equipped for the work it is required to do; nevertheless, the cost of maintaining it—for apparatus, chemical reagents, etc.,—is considerable, and additions and repairs have to be made from time to time. It is only by the most rigid economy that we have been able to carry on the work in all the departments under the present appropriation.

Bacteriological Department.

The value of the bacteriological work to the public health interests of the state cannot be realized by the public because such investigations are largely of a private nature, the individual facts in each case being reported solely to the attending physician. The tables given elsewhere show that, for the period included, 4,568 bacteriological examinations were made at

the laboratory for physicians alone, as an aid to them in determining the nature of the disease in question. In the laboratory it is often possible to state positively the nature of a malady before it can be determined by clinical symptoms. Still further, as in cases of mild diphtheria, it is often the only certain means of obtaining indisputable knowledge as to whether or not the disease is of an infectious character. Bacteriological work becomes, therefore, of great importance as an aid to diagnosis in suspected cases of tuberculosis, diphtheria, typhoid fever, and some other pathological conditions. By this means tuberculosis may often be diagnosed before the clinical symptoms are sufficiently pronounced to make the case one of certainty, and this knowledge comes at a time when it is essential to know the facts in order that successful treatment may be inaugurated.

In diphtheria—to differentiate this disease from other forms of sore throat—the laboratory becomes the only positive source of knowledge. In this disease it is also made available by many health officers, to determine when a patient or family may safely be discharged from quarantine.

In typhoid fever the Widal test is valuable corroborative evidence of this disease.

Of the 4,568 bacteriological examinations above referred to, 2,473 were in suspected cases of tuberculosis, 1,440 were diphtheria investigations, 492 in suspected typhoid fever, and 162 of miscellaneous character.

Pulmonary Consumption Notification.

The Legislature of 1905 enacted a law (see page 259) requiring the attending physician or some member of the family to report to the local board of health every death and every removal of a consumptive patient, and imposing upon the board the duty of disinfecting the infected premises.

The law further requires that the work of disinfection shall be done in accordance with methods recommended by the State Board of Health. A copy of the law, together with a description of methods of disinfection approved by the State Board of Health, was published in the April, 1905, *Sanitary Bulletin*, and sent to all physicians and boards of health in the state. Subsequently, under date of June 30, 1905, special attention was called to the law in a circular addressed to physicians, boards of health, and the public.

Restriction and Prevention of Consumption.

In another part of this report will be found a paper on the "Prevalence, Cause, Restriction and Prevention of Consumption." In April, 1906, this paper was published as a bulletin of the State Board of Health, of

which 6,000 copies have already been distributed. The demand for it has been large. Local organizations have become sufficiently interested to distribute copies in their respective localities, and from reports received it is evident that this pamphlet is accomplishing a great deal toward the enlightenment of the public upon this important subject. Copies will be furnished to any citizen of New Hampshire upon application.

Typhoid Fever.

Elsewhere in this report is a paper on the "Prevalence, Cause, Restriction and Prevention of Typhoid Fever." It was also published in a recent issue of the *Sanitary Bulletin*, and has already been quite widely distributed.

It is the practice of the board to send these papers on special diseases into the locality where the given disease may be prevailing, so that the local board of health may distribute copies to families in the immediate neighborhood, for at such a time more interest is taken in the subject.

This paper is an interesting study in showing the gradual reduction of typhoid fever in New Hampshire, which must have been brought about very largely through the better supervision of public and private water supplies, disinfection, etc.

Disposal of Household Waste.

In July, 1905, the board published in pamphlet form a very valuable paper contributed by Robert Fletcher, Ph. D., director of Thayer School of Civil Engineering, Dartmouth College, and a member of the State Board of Health, relative to the disposal of household wastes at summer resorts, encampments and farmhouses; pure water supplies, and other sanitary conditions.

A large number of copies of this paper have been distributed, and the demand for it has been considerable. It has attracted public attention in other states, and has been sought by sanitary engineers and others interested in this particular work.

The size of this report precludes its publication herein, but copies may be had upon application to the board.

A Sand Filter for the Home.

This is another valuable contribution from the pen of Professor Fletcher in the interests of a pure water supply. (See page 285.) The article embodies the results of practical experience, and describes a sand filter preëminently adapted to household requirements.

This work has been highly commended by eminent authorities, and has already been published in some of the highest class engineering journals.

WATER SUPPLIES OF TOWNS AND CITIES.

EXAMINATION OF WATER SUPPLIES.

During the past two years the policy has been continued of making periodic examinations at the laboratory of all the public water supplies of any degree of importance. In view of the insignificant size of some of the smaller supplies, and their obvious exemption from any appreciable chances of pollution, this inspection has been omitted in some instances; on the other hand, certain of the larger supplies have received our almost constant supervision, many analyses having been made.

Of the 235 towns in the state, 82 now have water-supply systems, numbering in all 98 supplies, of which 46 are owned by the town or by a precinct, and 52 by private individuals or corporations. Of these 98 supplies, 26, or 26.5 per cent., are derived from ponds; 18, or 18.4 per cent., from streams; 16, or 16.4 per cent., from wells; 30, or 30.6 per cent., from springs; and 8, or 8.1 per cent., from combinations of these sources. Several of the pond supplies are in reality impounded streams or low areas with abundant springs whose flowage is collected in an excavated basin. Besides those above mentioned, during the past two years examinations have also been made of eight special private supplies furnishing institutions, parks, etc. In addition to the domestic consumption, these systems also furnish much water for manufacturing operations, fire protection, street sprinkling, etc.

A majority of the systems use cast-iron pipe for distributing mains, and galvanized iron supply pipe. Cast-iron supply pipes are also extensively employed, and several of the smaller systems still convey their water through lead distributing mains and supply pipes. In some instances, trouble from lead poisoning is reported where lead pipes are used. From the fact that most of our New Hampshire waters are soft and attack lead vigorously all systems laid in the future should be some form of iron pipe, either plain cast iron, galvanized iron, or cement-lined iron.

Doubtless, in the majority of instances, a service pipe of galvanized iron will be found the most satisfactory, cost and general wearing qualities considered. However, it is unfortunately true that with certain waters the zinc coating is not very durable. This is notably the case with waters

containing appreciable quantities of dissolved gases (air or carbon-dioxide), so that in those cases where a noticeable rush of gas to the surface immediately on drawing or heating is observed, more or less action on zinc may be anticipated. Zinc-corroding waters, unlike those attacking lead, are apt to be hard, and this characteristic is, perhaps, more often observable in those supplies having their source at a considerable depth below the surface, for the reason that the latter are more highly impregnated with gases than are those of the surface class.

As regards the relative toxicity of lead and zinc, the former is very much the more to be feared. Susceptibility to lead poisoning varies largely with the individual, probably due to the fact that some systems are able to eliminate this metal more readily than others. For this reason, while it is generally held that a quantity equivalent to 0.040 parts of metal in 100,000 parts of water will not ordinarily prove deleterious to the health of the user, nevertheless, there are cases on record where a much smaller proportion has been a source of trouble. On the other hand, there are instances where whole families are using water containing lead considerably in excess of 0.040 parts, apparently without the development of any ill results.

Unlike lead, zinc is not a cumulative poison, and the presence of this metal in very small quantities is not, ordinarily, any ground for uneasiness. New galvanized pipe usually gives a milky appearance to the water, in most cases disappearing after a few weeks' use. However, we have had two instances brought to our attention during the past two years where the water was found to persistently carry notable quantities of zinc, the latter being, undoubtedly, a cause of illness. But the consensus of present opinion would seem to be that, while cases of this nature occasionally arise, yet, as the salts of zinc are much less poisonous than those of lead, and as the quantity of such in a water is usually but slight, the chances of any impairment of health through this means may ordinarily be considered as insignificant.

In addition to the forms of pipe already mentioned, a word should, perhaps, be said with regard to tin-lined lead, a certain amount of which is in use in New Hampshire. This variety is more expensive, and it is especially necessary to specify that only the very best grade be supplied, as the cheaper grades liable to be furnished are worse than useless for this purpose. Even at the best, on account of the chances for galvanic action, corrosion is sometimes more pronounced than when the pipe is left uncoated.

With very few exceptions, the water supplies of our towns and cities are of excellent quality. In this connection an analysis of the results of inspection during the past two years reveals the following facts:

Total number of examinations made	489
Analyses indicating good condition	340
Analyses unfavorable, or indicating some abnormal condition	149
Supplies classed as of good quality	72, or 73.5%
Classed as variable, because of periodic use of contaminated auxiliaries	5, or 5.1%
Classed as of indifferent or doubtful quality	11, or 11.2%
Classed as inferior or polluted	10, or 10.2%

As regards the above deductions, it may be stated that this classification tends to be conservative on the side of purity. Indeed, it would not be difficult to find towns and cities in other sections of the United States the supplies of which are little or no better than many of those classed above as "doubtful" or "inferior," and yet are looked upon by the users as being of comparative excellence.

In a number of instances supplies have been obtained by impounding the waters of streams without any preliminary preparation of the flowed surface. The result is invariably a water of high color, and containing a large amount of dissolved vegetable matter. At certain seasons such waters are also liable to exhibit more or less odor and taste, and, as food for the growth of all kinds of organisms is necessarily present, supplies of this class not infrequently become a cause of different forms of intestinal disturbances. As the decay and elimination of the submerged vegetable matter is a very slow process, the necessity, when such supplies are to be constructed, of removing all vegetable mould and surface growth of every description cannot be too strongly emphasized.

Another feature that needs to be urged in connection with the introduction of new supplies is the desirability of having a thorough investigation at the laboratory of the supply in view, such investigation preferably including a series of analyses extending over at least one year. By this means any unfavorable developments due to seasonal influences, the growth of algæ or other organisms whereby undesirable taste or odor is produced, or any special periodic tendency to pollution,—these could thus be predicted, not infrequently with very material ultimate saving of expense to the town or company constructing the supply.

For a time after the inception of the Laboratory of Hygiene it was the practice to make sanitary analyses of water whenever requested to do so by owners and users of private supplies. This unconditional policy involved the examination of many samples from sources that were not exposed to pollution, and whose purity was unquestioned. As the demand on the part of the public for this class of service steadily increased

and eventually reached the point where an unduly large share of the time of the staff was thus occupied, it became necessary to impose certain restrictions. The following regulations were, therefore, established:

THE STATE OF NEW HAMPSHIRE.

STATE BOARD OF HEALTH.

REGULATIONS GOVERNING THE EXAMINATION OF PRIVATE WATER SUPPLIES AT THE STATE LABORATORY OF HYGIENE.

I. A person desiring the analysis of a private water supply must fill out an application blank, stating the reasons for such a request fully and explicitly.

II. No water will be examined simply to satisfy the curiosity of any one, or to substantiate a belief that the water is of good quality. There must be some valid reason given.

III. Examinations will be made:

1. If there is sickness or ill health among persons using the water, of a character that might reasonably be charged to its use.
2. If the appearance of the water indicates contamination.
3. If it has an unnatural taste.
4. If it has an unusual odor.
5. If it is abnormally colored.
6. If the attending physician, or the local board of health, requests an analysis.
7. If it is desired to ascertain if water received through lead pipe from a spring contains an amount of lead that would render it unfit for domestic use.
8. If it is wanted to ascertain if the water in an old, abandoned well, which it is proposed to re-open, is suitable for family use.
9. If for any other cause which may be deemed sufficient by the State Board of Health to warrant an analysis.

IV. In the event that an application for water analysis is granted, a container, with full directions for collecting the sample, will be sent to the applicant. No charge will be made for the analysis; but the party sending the sample must prepay express charges on the same to the State Laboratory of Hygiene.

NOTICE CONCERNING THE ANALYSIS OF PRIVATE WATER SUPPLIES.

It is not the practice of state boards of health to analyze private water supplies. Work of this kind is usually limited to the examination of public supplies of towns and villages. But, having a desire to serve the citizens of the state as far as possible, no regulations or restrictions have hitherto been made concerning waters forwarded to the State Laboratory of Hygiene for examination. As a result, we have made many analyses of private supplies, wells, springs, etc., that were perfectly good waters, and no suspicions existed to the contrary.

It has come to a point that the demand for work of this kind is so great as to overtax the working capacity of the laboratory, to the exclusion, or rather, the limitation of food analysis, and other investigations of public health importance.

We are, therefore, obliged to establish what we believe to be not unreasonable requirements to govern our future work in this direction.

Hereafter we shall require an application blank to be filled out in all cases.

If your desire for an analysis comes within the scope of the regulations given above, please fill out the blank as fully as possible and forward to this office. Upon receipt of same the matter will be given prompt attention.

IRVING A. WATSON,
Secretary.

November 1, 1904.

The foregoing regulations proved to be insufficient to prevent the sending of samples of water to the laboratory when no suspicion of contamination existed, but simply from a desire to ascertain the character of the supply, and therefore the board was compelled to issue the following regulation:

THE STATE OF NEW HAMPSHIRE.

STATE BOARD OF HEALTH.

LABORATORY OF HYGIENE.

SPECIAL NOTICE IN REGARD TO WATER ANALYSIS.

The demand upon the State Laboratory of Hygiene for analyses of private water supplies, for all sorts of reasons, has become so great as to make it impossible to do all the work asked for. It is the purpose of the State Board of Health to make regular examinations of the public water supplies of the state, samples of which will be asked for at regular intervals through official channels, and therefore there is no occasion for private individuals to ask for analysis of water from such supplies.

For the present we must restrict our analyses of private water supplies to such as are suspected of causing sickness, that is, where one or more members of the family are ill and the water is suspected to be the cause.

The application for an analysis must be made upon the blank furnished by the board, and must state specifically the facts in the case.

Per order,
IRVING A. WATSON,
Secretary.

CONCORD, N. H., Aug. 1, 1905.

In general it may be stated that all requests for analyses should be made by boards of health or at the advice of a physician, and in no case will such examinations be made previous to the filing of a formal application therefor. Another requisite is that samples shall be forwarded in the container supplied by the laboratory; unless by special arrangement, no attention will be paid in the future to samples received in bottles,

jugs, jars, tin cans, etc., furnished by the sender; also the blank form accompanying the container must be completely filled out and returned with the sample. The importance of the latter requirement does not appear to be appreciated in all cases and there is sometimes a tendency manifested to withhold any information believed by the sender to be incompatible with the submission on the part of the laboratory of an impartially rendered report. This is a misconception; the examination is in no wise comparable to an "assay"; on the contrary, such report is in the nature of a diagnosis and involves a rendering of judgment based upon all ascertainable data. In this connection it is perhaps unnecessary to state that it is the custom to make the examination for lead only when the question relative to the use of lead pipe is answered in the affirmative.

Following is a summary of the results of examinations made of private supplies during the past two years:

Number of analyses representing water of good quality	358
Doubtful or indicating poor condition of supply	142
Reported as organically unfit for use	415
Containing an excessive amount of lead	183
Containing an excessive amount of zinc	2
Total examinations of private supplies	1,079

By far the greater number of the examinations of private supplies are made during the period from May 15 to October 15, the greatest demand appearing during July and August. Of late an increasingly large number of applications for this service are being received from summer residents, and especially from those who have recently purchased homes in New Hampshire. It has been our policy to uniformly comply with such requests, when properly made, so far as time and facilities have permitted.

Following are reports of water supply examinations, alphabetically arranged by cities and towns. All results are given in parts per 100,000.

ACWORTH.—No public water supply. Families get their water from wells or from springs, and lead pipe is used as a rule. Of seven supplies from private sources examined, five were found to be of good quality, one was polluted and one contained an excess of lead.

ALBANY.—There is no water supply other than wells and springs. The wells are mostly dug; a few are driven.

ALEXANDRIA.—No public supply. Water is obtained from private wells and springs. One supply was examined which proved to be polluted.

ALLENSTOWN.—(See Pembroke.)

ALSTEAD.—The soil in the valley in which this town is situated is sandy loam of little depth; subsoil, gravel and cobble; on the hills, clayey soil, while the subsoil is closely packed, clayey gravel. Three or four families here and there have piped springs or shallow wells for their water supply. At East Alstead is one well to which the public have access more or less.

ALTON.—The Alton & Alton Bay Water Works Company, established in 1892–'93, supplies about 100 families (90 per cent. of the population), with water from a spring, except in dry weather, when it is pumped from Lake Winnepesaukee to a reservoir of 150,000 gallons' capacity. (See special report elsewhere.)

Chemical Examination of Water from Faucet of Supply of Alton & Alton Bay Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1902														
782	Sept. 6	None	S. earthy	None	0.0	7.40	3.50	.0000	.0030	.0220	.0000	.27	3.10	....	..
	1903														
1337	July 16	Slight	Con. fine	S. veg.	0.15	4.70	3.00	.0000	.0000	.0000	.0000	.15	2.60	....	..
	1904														
1936	May 9	Slight	None	V. slight	0.0	5.50	3.00	.0010	.0012	.0050	.0000	.13	2.20	....	..
2109	June 28	Slight	None	S. earthy	0.0	7.40	3.80	.0000	.0018	.0000	.0000	.15	3.60	....	..
	1905														
2655	Jan. 23	None	None	S. earthy	0.1	5.8	3.8	.0000	.0014	.0100	.0000	.12	2.2	....	..
2965	July 7	Slight	Con. floc.	S. foul	0.30	5.7	3.7	.0000	.0012	.0000	.0000	.12	2.0	....	..
3010	July 24	Slight	Slight	Earthy	0.1	3.3	1.1	.0010	.0070	.0000	.0000	.15	0.4	....	..
3023	July 27	V. slight	None	None	0.1	5.3	3.2	.0016	.0028	.0050	.0040	.17	2.4	....	*
3058	Aug. 7	V. slight	Slight	Much vg	0.6	4.8	2.2	.0000	.0114	.0050	.0000	.17	1.1	....	*
3277	Oct. 31	Sl. opal.	V. slight	Much vg	0.2	4.7	4 2	.0014	.0034	.0180	.0000	.22	2.6	....	..
	1906														
3914	Aug. 29	V. slight	V. slight	None	0.10	2.2	1.2	.0022	.0078	.0100	.0000	.15	0.9	....	*
3968	Sept. 13	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	....	*
3969	Sept. 13	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	....	*
3988	Sept. 18	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	....	*
3989	Sept. 18	.....	.....	.....	....	.. ..	....	.....	.....	.....	.....	....	....	....	†

* Colon B. present.
† B. coli not present.

Chemical Examination of Water Supplies in Alton Camp Ground.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3973	1906 Sept. 12	None	V. slight	Veg.	0.1	.....	....	.0010	.0048	.0050	.0000	.10	1.2	....	*
3985	Sept. 18	None	None	None	0.0	.....	....	.0006	.0010	.0050	.0000	.60	2.4	...	†

* Tap from spring.
† Camp Ground well.

Of four supplies from private sources examined, one proved to be of doubtful quality, one was condemned as unfit for use, and two contained an excess of lead.

Amherst.—A private supply, inaugurated in 1837, furnishes water from wells on hill dug from five to twenty feet deep. The service and main pipes are of lead. Most of the families in the village are supplied from this source, but there are many private wells besides.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
422	1902 Mar. 3	None	None	None	0.0	.....	....	.....	.....	.....	.....	...	1.20	.1600	..
423	Mar. 3	None	None	None	0.0	.....	....	.....	.....	.....	.....	...	1.20	.1100	..
424	Mar. 3	None	None	None	0.0	.....	....	.....	.....	.....	.....	...	1.40	.0265	..
3093	1905 Aug. 17	None	Slight	S. earthy	0.00	5.5	3.7	.0000	.0000	.0100	.0000	.15	1.5	.070	*a*
3504	1906 Mar. 7	None	None	V. slight	0.00	4.5	3.8	.0008	.0044	.0100	.0000	.20	1.1	.....	*a*
3109	1905 Aug. 22	None	Slight	S. foul	0.00	3.6	2.2	.0010	.0020	.0080	.0000	.15	....	.020	*b*
3505	1906 Mar. 7	None	None	None	0.00	4.1	2.1	.0008	.0044	.0100	.0000	.20	0.9	.020	*b*
3085	1905 Aug. 15	None	None	None	0.00	5.8	3.0	.0006	.0008	.0000	.0000	.05	1.8	.010	*c*
3326	Dec. 6	None	None	None	0.20	6.5	3.9	.0010	.0066	.0050	.0000	.29	0.6	....	*c*
3273	Oct. 30	None	None	None	0.05	5.3	2.9	.0010	.0016	.0050	.0000	.07	1.6	.....	*d*

a Spring supply of Miss Abby Melindy.
b Spring supply of J. C. Taylor.
c Spring supply of Mrs. Elizabeth Nichols.
d Spring supply of Herbert H. Belden.

Examination of nine supplies received from private sources, resulted as follows: three of good quality, one doubtful, two polluted and three with an excess of lead.

ANDOVER.—Water is furnished to about 30 families in Andover Center by C. E. Carr, from three reservoirs supplied by eight springs on the side of Ragged Mountain. The watershed is partly wooded and partly cleared; no inhabitants. The springs are dug from six to fifteen feet deep, and the water flows by gravity through about two miles of mains, one third iron and two thirds lead pipe. The service pipes also are some lead and some iron. There are many private wells within the area of this supply. A part of the families of West Andover are supplied from springs on the west side of Ragged Mountain. Cilleyville is supplied from private wells. East Andover and all the rest of Andover also from wells, except five families which have water from springs.

Chemical Examination of Water Supplied Andover Centre.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
841	1902 Oct. 9	None	Slight	None	0.0	7.00	2.90	.0000	.0000	.0000	.0003	.12	2.20	....	..
855	Oct. 12	None	None	None	0.0	5.50	3.40	.0000	.0000	.0000	.0000	.12	2.30	....	..
3078	1905 Aug. 14	None	None	None	0.00	6.4	3.7	.0000	.0010	.0100	.0000	.12	1.9	....	..

Nineteen samples representing private supplies were examined. Of these seven were found to be of good quality, three doubtful or in poor condition, eight were polluted and four contained an excess of lead.

ANTRIM.—A water supply was installed by the town in 1893, the source being a pond of about 16 acres in area, and of an average depth of 16 feet. It is a gravity system, employing three miles of pipe, wooden main, and iron service pipes. Ninety per cent. of the population take this water.

Chemical Examination of Water from Tap of Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1901														
95	July 30	None	S. floc.	Strong veg.	0.4	3.40	.80	.0000	.0242	.0000	.0000	.11	....	....	..
96	July 30	None	Much floc. veg.	Dec. vg. & musty	1.1	4.30	2.20	.0036	.0180	.0000	.0000	.12	....	....	*
97	July 30	None	Slight	Decided musty	0.3	4.50	1.80	.0074	.0150	.0080	.0000	.12	....	....	..
98	July 30	None	Slight	Decided aromat.	0.4	3.20	1.20	.0028	.0184	.0000	.0000	.13	....	....	..
177	Sept.20	None	Slight	Faint veg.	0.25	3.50	.60	.0028	0180	.0000	.0000	.09	....	....	..
178	Sept.20	None	Slight	Faint veg.	0.25	4.40	.90	.0026	.0180	.0000	.0000	.09	....	....	..
	1904														
1950	June 14	Slight	V. slight	Dec. foul	0.15	2.60	.90	.0000	.0028	.0000	.0000	.05	.90	....	..
	1905														
2663	Jan. 28	None	None	V. S. vg.	0.15	4.2	2.3	.0236	.0086	.0200	.0000	.12	1.4	....	..
2963	July 7	None	Slight	S. earthy	0.25	2.50	0.8	.0000	.0024	.0000	.0000	.12	0.6	....	*
3272	Oct. 31	None	None	None	0.20	3.7	1.3	.0014	.0098	.0050	.0000	.07	0.4	....	..
	1906														
3845	Aug. 15	None	None	None	0.1	2.5	1.0	.0024	.0140	.0050	.0000	.05	0.7	....	..

*Colon B. present.

Of 13 supplies from private sources examined five proved to be of good quality, one of doubtful quality, five polluted, and two contained an excess of lead.

ASHLAND.—The town operates a public water supply of excellent quality.

Chemical Examination of Water from Tap of Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
840	1902 Oct. 9	None	None	Veg.	0.25	6.50	1.00	.0000	.0064	.0000	.0000	.07	1.00	....	..
1426	1903 Aug. 10	None	V. slight	Dec. vg.	0.3	7.40	2.10	.0000	.0084	.0000	.0000	.075	1.60	....	..
1943	1904 May 9	None	None	None	0.15	4.00	1.10	.0000	.0014	.0000	.0000	.150	1 10	....	*
2659	1905 Jan. 24	None	None	V. S. vg.	0.1	5.5	1.7	.0054	.0054	.0050	.0000	.12	0.7	....	..
2964	July 6	None	None	None	0.25	3.5	1.7	.0000	.0104	.0000	.0000	.07	0.7	....	*
3274	Oct. 31	None	None	S. veg.	0.20	3.4	2.0	.0014	.0060	.0050	.0000	.07	0.7	....	..
3847	1906 Aug. 15	V. slight	V. slight	Slight	0.30	3.8	1.7	.0018	.0134	.0050	.0000	.07	1.2	....	..

* Colon B. present.

One private supply was found to contain an excess of lead.

ATKINSON.—No public supply. Water is obtained from private wells.

AUBURN.—No public water supply. There is one private supply from which seven families are furnished, and one public watering trough for the town.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3027	1905 July 27	None	None	None	0.00	4.9	3.2	.0014	.0014	.0000	.0000	.25	1.6	....	..
3280	Nov. 1	None	S. ferrug.	S. earthy	0.05	3.0	1.0	.0014	.0024	.0050	.0000	.30	0.9	....	*
3851	1906 Aug. 16	Consid. ferrug.	S. ferrug.	Earthy	0.08	4.1	3.4	.0040	.0028	.0100	.0001	.40	2.3	....	..

* Colon B. present.

Examination of four private supplies showed one to be of good quality and three unfit for use.

BARNSTEAD.—No public supply. Of eight private supplies examined three were found to be polluted, and five showed an excess of lead.

BARRINGTON.—No public supply. Of six private supplies examined three were found to be of doubtful quality, or in poor condition, and three were polluted.

BARTLETT.—The public water supply, owned by the village precinct, was installed about the year 1888 by the Bartlett Water Company. The source is a stream having a watershed of two square miles, wooded land, no inhabitants.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
880	1902 Oct. 21	None	None	V. S. vg.	0.1	4.90	.80	.0000	.0020	.0000	.0000	.07	.60	....	..
1339	1903 July 15	None	None	S. veg.	0.15	5.30	1.20	.0000	.0020	.0000	.0000	.10	0.90	....	..
1991	1904 May 24	None	None	V. slight	0.05	5.40	1.90	.0000	.0014	.0000	.0000	.05	1.20	....	..
2677	1905 Jan. 31	None	None	None	0.00	5.0	2.6	.0000	.0000	.0000	.0000	.10	1.1	....	..
2978	July 11	None	V. slight	None	0.12	4.0	2.0	.0006	.0006	.0000	.0000	.05	0.7	....	..
3286	Nov. 9	None	V. slight	None	0.15	2.7	2.0	.0010	.0048	.0050	.0000	.10	0.3	....	..
3653	1906 Aug. 16	None	V. slight	None	0.08	4.0	2.9	.0010	.0080	.0050	.0000	.12	1.0	....	..

BATH. Water is supplied by two private companies from springs, dug in a clay soil. The water runs by force of gravity, with about two miles of iron main and service pipes. There are 12 or 15 wells within the area supplied.

Chemical Examination of Water from Faucet of Bath Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
802	1903 Sept. 18	None	None	None	0.0	7.30	3.60	.0000	.0014	.0150	.0002	.15	3.60	....	..
2999	1905 July 20	None	Slight	S. earthy	0.05	6.2	4.9	.0000	.0014	.0200	.0000	.15	3.2	....	*

* Colon B. present.

BEDFORD.—No public supply. Water is obtained wholly from private wells and aqueducts on the farms. Six waters from private sources were examined, of which two were found to be good, one doubtful, two polluted, and one contained an excess of lead.

BELMONT.—The Belmont Water Works, owned by the town, were installed in 1893. Water is obtained from wells, supplemented by a stream in dry seasons. There is a pumping station for use in dry seasons, by which water is pumped from a stream to the reservoir. There is also a private supply in the town. The pipes are of wood mains, and galvanized iron service.

Chemical Examination of Water from Tap of Belmont Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
864	1902 Oct. 15	None	None	None	0.0	5.60	3.00	.0000	.0030	.0000	.0000	.12	3.00	....	..
1327	1903 July 13	Slight	Slight	Dec. foul	0 05	5.10	2.60	.0014	.0012	.0300	.0000	.25	1.20	....	*
1328	July 13	None	None	V. slight	0.05	4.60	2.90	.0000	.0010	.0300	.0000	.20	1.50	....	..
1329	July 13	None	None	None	0.05	4.30	2.00	.0000	.0000	0150	.0000	.20	1.20	....	..
1931	1904 May 7	None	None	Slight	0.0	2.50	.90	.0008	.0034	.0000	.0000	.125	.70	....	..
2162	July 18	None	None	None	0.1	3.20	2.10	.0000	.0000	.0000	.0000	.075	1.90	....	..
2481	Oct. 25	None	V. S. fine	S. veg.	0.30	4.3	2.3	.0000	.0014	.0000	.0000	.10	1.8	....	..
2482	Oct. 25	None	Con. floc.	V. slight	0.00	3.3	2.0	.0000	.0000	.0000	.0000	.07	1.9	....	..
2518	Nov. 7	None	Con. floc.	Dec. vg	0.25	4.6	2.7	.0010	.0058	.0000	.0000	.12	1.9	....	*†
2560	Nov. 28	None	None	None	0.10	4.0	3.2	.0000	.0000	.0000	.0000	.17	0.9	....	..
2657	1905 Jan. 23	None	None	Slight	0.20	4.4	2.7	.0000	.0000	.0100	.0000	.15	0.7	....	..
2986	July 17	None	None	Slight	0.20	4.5	2.7	.0000	.0010	.0100	.0000	.15	0.7	....	†
3279	Nov. 1	None	V. slight	Veg.	0.20	5.1	3.6	.0014	.0058	.0050	.0000	.22	0.7	....	..
3636	1906 May 24	None	V. slight	S. veg.	0.25	4.8	2.6	.0010	.0060	.0100	.0000	.10	...	....	†
3651	May 30	.....	.....	.....	....	.....	....	.....	....	.....	.....	....	....	....	†
3856	Aug. 17	None	V. slight	None	0.20	5.0	2.7	.0010	.0044	.0050	.0000	.10	1.1	....	..

* Stream at pumping station. The quality of this water varies according to the use of the auxiliary stream supply.

† Colon B. present.

BENNINGTON.—No public supply. The Bennington Water Works Company, a private company, in 1900 installed a system supplied from springs, with a supplementary supply from a stream.

Chemical Examination of Water from a Faucet of the Bennington Water Works Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
751	1902 Aug. 27	None	V. slight	None	0.15	6.50	2.80	.0000	.0000	.0000	.0000	.10	1.50	...	..
1334	1903 July 15	None	None	V. slight	0.1	3.70	2.30	.0000	.0030	.0000	.0000	.05	1.50	....	..
341	July 16	None	None	Veg.	0.1	3.40	2.70	.0000	.0034	.0000	.0000	.05	2.00	....	..
2262	1904 Aug. 9	Very marked	Much floc. red	None	0.6	6.10	1.70	.0000	.0034	.0050	.0000	.10	1.40	....	*
3069	1905 Aug. 9	None	Slight	S. earthy	0.05	4.5	2.3	.0000	.0026	.0050	.0000	.10	1.2	....	..
3287	Nov. 8	None	None	None	0.00	5.4	3.9	0010	.0044	.0050	.0000	.12	0.9	....	..
3885	1906 Aug. 23	None	None	Slight	0.05	4.2	3.6	.0010	.0032	.0050	.0000	.12	1.5	....	..
3960	Sept. 11	None	Ferrug.	.....	0.10	6.6	4.7	.0014	.0060	.0000	.0003	.20	1.1	....	..
3961	Sept. 11	V. slight	V. slight	Veg.	0.10	5.2	2.1	.0008	.0110	.0000	.0000	05	1.1	....	†

* Colon B. present. † Reservoir.

The analysis of three samples received from private sources showed two to be of good quality, one polluted.

BENTON.—Water is obtained from private springs, through lead pipes and logs, and from wells. The wells are dug from eight to twenty feet deep. There are many springs about the town.

BERLIN.—No public supply. There are two private supplies, owned and operated by one company,—the Berlin water works, built in 1892–'93, and the Cold Water Spring Company, installed in 1898. The source is a stream and springs. For a period of about six weeks each year the latter supply has to be supplemented by water pumped from Androscoggin River, above the city limits.

Chemical Examination of Water from Tap of Berlin Water Company,

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
843	1902 Oct. 9	None	None	V. slight	0.75	6.50	1.40	.0000	.0112	.0000	.0000	.05	1.40	..	....
1061	1903 Feb. 22	None	None	None	0.0	12.30	6 60	.0000	.0000	.0150	.0000	.07	2.00	..	....
1326	July 13	None	None	V. slight	0.65	4.60	1.80	.0000	.0104	.0000	.0000	.05	0.70	..	....
1491	Sept. 3	None	None	V. slight	0.4	3.60	1.40	.0000	.0044	.0000	.0000	.07	1.10	..	....
1828	1904 Feb. 1	Slight	Much fine	V. slight	0.0	9.80	7.20	.0016	.0008	.0000	.0000	.10	5.80	..	†
2179	July 20	None	None	None	0.0	12.40	9.30	.0000	.0000	.0200	.0000	.35	7.4	..	....
2383	Sept. 16	None	Slight	None	1.10	8.00	2.60	.0006	.0166	.0700	.0000	.05	1.4	..	‡
2680	1905 Feb. 4	None	None	V. slight	0.25	4.8	2.4	.0000	.0000	.0150	.0000	.05	0.6	..	....
3117	Aug. 25	None	S. floc.	Veg.	.25	4.0	1.8	.0008	.0072	.0050	§	.05	....	..	*a
3118	Aug. 25	None	None	None	0.05	5.4	2.7	.0006	.0026	.0450	.0000	.07	....	..	*b
3389	1906 Jan. 10	None	None	S. veg.	0.20	6.3	3.3	.0008	.0040	.0250	.0000	.07	1.2	..	....
3562	Apr. 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	*c
3565	Apr. 23	V. slight	None	S. veg.	0.05	20.5	14.8	.0086	.0084	.3000	.0005	2.00	5.4	..	*d
3566	Apr. 23	V. slight	V. slight	M. veg.	0.05	8.5	4.0	.0136	.0154	.0100	.0000	0.10	1.6	..	*e
3567	Apr. 23	None	None	Slight	0.20	7.5	3.5	.0020	.0080	.0100	.0000	0.10	1.8	..	*f
3568	Apr. 23	Slight	S. floc.	M. veg.	0.60	7.8	4.2	.0006	.0134	.0100	.0000	.07	1.6	..	....
3571	Apr. 23	None	V. slight	.....	0.40	6.8	4.5	.0034	.0110	.0100	.0000	.05	1.4	..	*g
3573	Apr. 25	None	None	None	0.20	4.7	2.7	.0010	.0070	.0750	.0000	.05	0.6	..	h
3574	Apr. 25	None	V. slight	S. veg.	0.05	4.2	2.0	.0014	.0074	.0100	.0000	.05	0.3	..	i
3659	June 5	None	None	None	0.00	5.1	3.5	.0012	.0014	.0150	.0000	.10	1.4	..	....
3660	June 5	V. slight	None	Slight	0.00	5.6	4.2	.0012	.0028	.0070	.0000	.10	....	..	b
3661	June 5	V. slight	V. slight	S. veg.	0.50	4.6	2.2	.0022	.0064	.0050	.0000	.07	0.6	..	i
3662	June 5	None	None	V. S. vg.	0.30	5.0	2.8	.0008	.0050	.0000	.0050	.05	1.4	..	j

* Colon B. present: *a* Bean and Horn brooks; *b* Cold Spring; *c* represents five samples, taken from St. Giles aqueduct, Green Street aqueduct, Western Avenue aqueduct, Berlin Mills aqueduct, East Side aqueduct, all show Colon B; *d* Brown and Main streets spring; *e* Damars reservoir; *f* Stahl reservoir; *g* East Side reservoir; *h* Horn Brook; *i* Bean Brook; *j* Green Spring.
† Artesian well of Berlin Water Company.
‡ Stream recently added to system.
§ Slight trace.

One private supply examined was found to be of good quality.

Bethlehem.—The precinct supply, completed in 1898, is from a stream. The watershed is wooded several miles each side. The water

is delivered by gravity through about twelve miles of iron service and main pipes. Ninety-eight per cent. of the population take this water.

Chemical Examination of Water Supplied by the Crystal Springs Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
347	1902 Jan. 3	Slight	Slight veg. and min.	Earthy veg.	0.2	5.30	3.80	.0074	.0076	.0400	.0000	.06	1.60	....	..
2998	1905 July 19	None	None	Slight	0.05	3.5	2.2	.0000	.0020	.0100	.0000	05	1.5	....	..
3360	1906 Jan. 8	None	None	None	0.00	3.9	1.7	.0006	.0022	.0300	.0000	.05	1.4	....	..
3883	Aug. 22	None	V. slight	S. foul	0.20	4.0	1.5	.0008	.0024	.0100	.0000	.05	0.4	....	..

One private supply was found to be polluted.

Boscawen.—Water is from the public supply, Penacook & Boscawen Water Precinct, constructed in 1892. The source is a pond of 340 acres; greatest depth, 36 feet; soil, largely gravel. The watershed is nearly seven square miles, both wooded and cleared. There are five or six houses on the shores of the pond. It is a gravity system, through 13 miles of wooden and galvanized iron pipe. About two hundred families are supplied.

Examination of Water from Tap of Penacook & Boscawen Water Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
789	1902 Sept. 9	None	None	S. veg.	0.45	10.10	1.80	.0000	.0142	.0000	.0000	.11	1.50	....	..
1944	1904 May 9	V. slight	Slight	Dec. veg.	0.3	4.20	1.70	.0000	.0032	.0000	.0000	.15	1.60	..	..
2690	1905 Feb. 9	None	None	None	0.25	6.4	2.4	.0000	.0010	.0000	.0000	.10	0.9	....	..
3096	Aug. 18	Consid.	Slight	Earthy	0.30	4.9	1.9	.0000	.0140	.0100	.0000	17	1.1	*	..
3394	1906 Jan. 13	None	None	S. veg.	0.50	5.0	2.5	.0024	.0084	.0100	.0000	.17	1.1	....	..
3860	Aug. 18	.....	.....	.....	0.40	5.3	2.9	.0028	.0114	.0050	.0000	.07	1.4	....	..

* Colon B. present.

One private supply was found to contain an excess of lead.

Bow.—No public supply. The examination of four private supplies showed one to be of good quality, while three were polluted and one contained an excess of lead.

Bradford.—No public supply.

Chemical Examination of Water from Lake Massasecum.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3749	1906 July 12	V. slight	S. veg.	None	0.2	4.5	1.8	.0028	.0154	.0030	.0000	07	0.6	....	..

Eight samples from private sources were received, of which four proved to be of good quality, one doubtful, two polluted and one showed much lead.

Brentwood.—No public supply.

Bridgewater.—The water supply is from springs and wells, located one on each homestead. At this writing many springs are dry, and in many cases water has to be obtained from brooks. One private supply examined proved to be of good quality.

Bristol.—Bristol Aqueduct Company, incorporated in 1886, supplies water from Newfound Lake, the area of which is about nine square miles. The watershed is largely wooded; some cleared land. It is a gravity system, with about six miles of pipe, mostly cement, but some cast-iron mains, and galvanized iron, lead and tin-lined service pipes. About three fourths of the population of the village use the aqueduct water, while there are a few wells, mostly located back on the hills, away from buildings.

Chemical Examination of Water from a Faucet of the Bristol Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
747	1902 Aug. 26	None	V. slight	S. veg.	0.15	3.90	1.50	.0016	.0050	.0000	.0000	.06	.40	....	..
1321	1903 July 13	V. slight	Slight	Dec.veg.	0.1	3.00	.90	.0028	.0044	.0000	.0000	.075	1.20	....	..
1945	1904 May 5	Slight	None	S. veg.	0.1	4.20	1.80	.0000	.0014	.0000	.0000	.075	1.50	...	*
2664	1905 Jan. 30	None	None	S. veg.	0.15	4.2	2.1	.0000	.0014	.0050	.0000	.10	0.6	....	..
2998	July 18	None	None	Vege'ble	0.10	3.9	1.9	.0000	.0024	.0000	.0000	.12	0.9	....	..
3351	1906 Jan. 2	None	V. slight	S. veg.	0.10	2.5	1.1	.0014	.0066	.0050	.0000	.07	0.7	....	..
3853	Aug. 17	None	V. slight	Vege'ble	0.10	4.1	2.2	.0014	.0070	.0050	.0000	.15	0.4	....	..

*Colon B. present.

Examination of three samples from private sources showed one good, one polluted and two with an excess of lead.

Brookfield.—No public supply.

Brookline.—No public supply. A well on the east side of the town is the source of the fountain and faucet in public square. Most of the wells are deep and afford very pure water.

Chemical Examination of Water from Public Fountain Supplied by a Well.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
827	1901 Dec. 10	None	None	S. foul.	0.0	9.30	7.00	.0000	.0076	.1250	.0002	.80	2.00	....	..

Campton.—No public supply. Thirteen samples from private sources were received. Two of these were of good quality, one doubtful, four polluted, while six contained much lead.

CANAAN.—No public supply. A private supply from Hart's Pond was introduced by the Crystal Lake Water Company in 1891.

Chemical Examination of Water from Crystal Lake Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
868	1902 Oct. 16	Marked	Much floc.	Dec.veg.	0.2	5.50	2.10	.0000	.0168	.0000	.0000	.07	2.00	....	..
3026	1905 July 28	V. slight	Slight	Earthy	0.20	4.8	2.0	.0022	.0080	.0050	.0000	.12	1.2	....	..
3510	1906 Mar. 6	None	None	None	0.10	5.3	3.1	.0014	.0074	.0050	.0000	.05	1.4	....	*

*Colon B. present.

Four samples from private sources were received, of which one was found to be of good quality, one doubtful, and two polluted. Use of water from one of these wells, semi-public in nature, was responsible for an epidemic of typhoid fever during the summer of 1906.

CANDIA.—There are two private supplies, the John H. Holt and the Dearborn Bros., each built in 1893. The first is from an artesian well 100 feet deep, pumped by windmill to a reservoir of 7,000 gallons' capacity, 10 feet diameter and 12 feet deep. This supplies 16 houses and two shoe shops.

The Dearborn Bros.' supply is from a spring about eight feet square and six feet deep, boxed up with plank and covered by a shed roof. This water is also pumped by windmill to a reservoir of 3,000 gallons' capacity, eight feet diameter and eight feet deep. This system furnishes water to five houses.

Both systems deliver through about one-fourth mile of galvanized pipe, main and service.

There are two public wells, one at Candia Village and one at Candia Depot.

Chemical Examination of Water from Supply of John A. Holt, East Candia.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
869	1902 Oct. 16	None	None	None	0.0	14.10	10.60	.0000	.0000	.4800	.0000	1.45	4.70	...	..
2733	1905 Mar. 2	None	None	None	11.2	11.2	8.0	.0000	.0000	.3000	.0000	1.49	3.9	...	..
3033	Aug. 1	Slight	Slight	S. earthy	0.15	16.8	9.8	.0000	.0000	.3000	.0000	1.67	5.2	...	..
3371	1906 Jan. 5	V. slight	V. slight	S. foul	0.00	16.7	11.3	.0024	.0038	.5000	.0003	1.95	6.0	...	..
3908	Aug. 27	None	V. slight	None	0.10	15.6	8.8	.0010	.0024	.1000	.0000	2.40	4.7	...	..

Of six private supplies examined four were found to be polluted and two of doubtful quality.

Canterbury.—No public water supply. There is one well at Canterbury Center to which the public have access. Of two private supplies examined one was of good quality, one polluted.

Carroll.—No public water supply.

Center Harbor.—The J. S. Graves' (private) water supply was inaugurated about the year 1900, the source being excavated springs of sufficient capacity to fill 2-inch pipes. About one mile of iron pipe, service and main, delivers this water to five or six families and three stores. Private wells are the principal source of supply to the inhabitants.

Some of the hotels are supposed to have water from springs, of which there are many on a near-by hill. There is spring water in plentiful supply here, and about $10,000 would construct a fine system of water works, which would afford a never-failing supply of water, and fire protection also. The gravity pressure would be sufficient.

Five private supplies were examined, three of which were of good quality, one doubtful, and one polluted.

Charlestown.—It is expected that public water works for this town will be completed about October 1, 1906. It will be a gravity system, from Mill Brook. Two reservoirs have been completed on the same brook, about sixty rods apart and two miles from the village. The water is mostly from springs, and an analysis at the State Laboratory of Hygiene showed it to be of the very best quality. About six miles of galvanized

iron service pipe will be required. Cost of system, $53,000. One hundred families will be supplied,—about two thirds of the population.

Chemical Examination of Water from Brook, Proposed Public Supply.

Number.	Date of collection.	Appearance			Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.			
2940	1905 July 1	None	S. floc.	None	0.28	4.9	2.0	.0000	.0030	.0200	.0000	.07	1.2	....

Of six private supplies examined all were found to be polluted, one also containing an excess of lead.

Chatham.—No public supply. The water supply is mostly from dug wells, a few springs, and a few places are supplied from brooks and comes through lead pipe. Some iron pipe is used.

Chester.—No general public water supply. There are several watering places for horses and cattle supplied by springs, and the town owns a well at one of the schoolhouses. Of six private supplies examined two were of good quality, three polluted, and two contained an excess of lead.

Chesterfield.—No public water supply.

Chichester.—No public supply. One private supply examined was found of good quality.

Claremont.—The town owns a water supply from a stream and a system of wells. The wells are 12 in number, dug 12 feet deep and covered with five feet of earth, so the depth of the well is seven feet; they are three feet in diameter after being stoned. The amount of water is very abundant and is pumped to the supply reservoir. Water from the stream is held in three reservoirs, with a capacity of 32,000,000 gallons.

Besides the public supply there are two private systems of water works in Claremont: one, the Tyler water works, was built in 1870, the source being springs. The springs are excavated all about a reservoir, into which the water runs. There are also springs in the bottom of the reservoir, which is about five acres in area.

The other private system, known as the Grannis water works, built about 1892 and owned and operated by Hermon Holt, Esq., is also supplied by springs. There are two small reservoirs from which this water

is taken: one some 30 feet in diameter, and about three feet deep on an average; the other some 75 feet in diameter, and of an average depth of about three feet.

Chemical Examination of Water from Town Supply Reservoir.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
797	1902 Sept. 11	None	None	S. veg.	0.15	6.30	2.30	.0000	.0056	.0000	.0000	.12	1.90	....	..
1323	1903 July 13	None	None	S. musty	0.2	4.30	2.20	.0000	.0056	.0000	.0000	1.07	1.90	....	..
1942	1904 May 9	Slight	None	None	0.1	5.60	4.40	.0000	.0030	.0000	.0000	.07	2.60	....	..
2668	1905 Jan. 30	None	None	Pec.	0.15	5.1	3.0	.0000	.0010	.0100	.0000	.12	1.5	....	..
3028	July 28	V. slight	S. fine	Slight	0.15	4.9	3.1	.0014	.0050	.0100	.0000	.10	1.9	....	..
3873	1906 Aug. 21	None	V. slight	Vega'ble	0.30	5.5	4.0	.0006	.0060	.0000	.0000	.05	1.2	....	..

Chemical Examination of Water from Faucet of Hotel, Supplied by Grannis Water Works.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
236	1901 Oct. 28	None	None	None	0.0	7.10	4.40	.0028	.0044	.0200	.0003	.07	....	.....	..
237	Oct. 28	None	None	None	0.0	9.20	5.30	.0028	.0054	.0200	.0003	.07	....	.....	..
241	Oct. 31	None	None	None	0.0	7.80	5.70	.0010	.0040	.0200	.0004	.07	2.40	.....	..
3042	1905 Aug. 1	Consid. earthy	Slight	Earthy	0.30	8.2	6.6	.0000	.0026	.0100	.0000	.07	3.9	S. trace	..
3364	1906 Jan. 4	None	None	None	0.00	7.5	5.2	.0010	.0010	.0100	.0000	.10	5.0	.0150	..

Chemical Examination of Water from Tyler Aqueduct.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
395	1902 Oct. 29	None	None	None	0.0	8.70	5.30	.0000	.0022	.0150	.0000	.09	3.10	V. S.	..
3378	1906 Jan. 7	None	None	None	0.00	8.8	5.8	.0008	.0016	.0200	.0000	.15	3.9	trace	..
3975	Sept. 13	None	None	None	0.05	11.1	8.0	.0010	.0074	.0100	.0000	.05	3.2	0.015	..

Eleven private supplies were examined, of which seven were of good quality, one doubtful, two polluted, and one contained an excess of lead.

CLARKSVILLE.—The water supply of the town is from private wells and springs, and is brought to the dwellings in logs, and pipes in some instances.

COLEBROOK.—This town does not own a public water supply. There are two private systems, the J. E. Lombard Water Works, supplying about forty families with water from springs, and the Colebrook Water Co., which constitutes the principal supply. The source of the latter is a stream and springs, and the water flows about four miles through iron pipes, both main and service. Three fourths of the watershed is cleared, and one fourth wooded. There are many private wells within the radius reached by these supplies.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2378	1904 Sept. 15	Marked	Slight	None	0.4	10.40	3.90	.0000	.0044	.0050	.0000	.050	5.50	...	...
2379	Sept. 15	None	V. much floc. veg.	None	1.1	11.00	2.80	.0000	.0001	.0000	.0001	.05	4.40	...	...
2380	Sept. 15	None	None	None	0.0	10.00	5.20	.0000	.0000	.0300	.0000	.07	2.70	...	...
2381	Sept. 15	None	V. much floc. veg.	None	0.5	11.70	5.00	.0000	.0072	.0000	.0000	.05	4.80	...	...
2636	1905 Jan. 9	None	V. much	Vege'ble	0.05	8.7	5.9	.0000	.0020	.0150	.0006	.07	2.7	...	*a
3089	Aug. 15	None	None	None	0.28	10.3	6.8	.0006	.0038	.0150	.0000	.05	5.5	...	a
3363	1906 Jan. 3	None	None	S. veg.	0.15	9.3	6.7	.0006	.0014	.0300	.0000	.05	4.9	...	a
3866	Aug. 18	None	None	None	0.40	9.3	7.3	.0014	.0080	.0000	.0000	.12	4.5	...	*a
3057	1905 Aug. 6	None	S. ferrug.	S. earthy	0.05	10.80	5.6	.0006	.0010	.0300	.0000	.05	3.9	...	b
3367	1906 Jan. 4	None	None	None	0.05	5.3	3.0	.0006	.0018	.0230	.0000	.05	2.6	...	b
3869	Aug. 20	None	Slight	None	0.05	5.0	3.3	.0008	.0010	.0050	.0000	.05	....	...	b

*Colon B. present; a Colebrook Water Co.'s supply, Annis brook; b J. E. Lombard supply.

One private sample submitted was found of good quality.

Columbia.—There is no village of any considerable size in this town. Nearly every house is supplied from springs with "water, mostly 'soft water,' pure, fresh, and cold." Very few wells in town.

Concord.—The Concord Water Works, owned and operated by the city, were installed in 1871–'72; extended to Penacook and St. Paul's School in 1882; high service extension in 1891; high service extended to Penacook in 1904. The source of the supply is Penacook Lake, with an area at high water of 337 acres; greatest area of good depth running from 10 to 75 feet; very little shallow water; bottom gravelly. The watershed, about 3⅛ square miles, is partly wooded and partly cleared. Outside of cottagers, a canvass showed 17 inhabitants to the square mile. The shores, excepting Penacook Park, which is well policed, are now rarely frequented by picnic parties. A few cottages, occupied during the summer, have been built on the shores, but they are under the sanitary supervision of the city health officer. The State Board of Health has also established rules and regulations for the protection of the purity of this body of water. The city owns and controls four fifths of the shore.

Chemical Examination of Water from City Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1	1901 May 22	V. slight	Slight	Dec. vg.	0.0	2.90	1.80	.0015	.0163	.0048	.0000	.13	....	.....	...
2	May 22	V. slight	Slight	Faintvg.	0.0	.....	....	.0013	.0122	.0048	.0000	.12	....	.....	...
3	May 22	Slight	Consid.	Dec. vg.	0.0	.....	....	.0013	.0149	.0048	.0000	.12	....	.....	...
4	May 23	Slight	Consid.	Dec. vg.	0.0	2.50	1.20	.0014	.0137	.0050	.0000	.12	....	.....	...
107	Aug. 6	None	None	Dec. vg.	0.12	3.30	.90	.0000	.0154	.0000	.0000	.11	....	.....	...
113	Aug. 12	Slight	Slight floc.	Dec. vg.	0.1	4.00	1.40	.0014	.0156	.0000	.0000	.10	....	.....	...
357	1902 Jan. 11	None	None	Veg.	0.1	3.20	1.20	.0030	.0138	.0000	.0000	.14	1.10	.....	...
398	Feb. 10	V. slight	V. slight	Veg.	0.12	3.70	1.90	.0044	.0136	.0000	.0000	.12	.90	.....	...
591	June 13	V. slight	V. slight	Dec. vg.	0.15	5.30	1.50	.0016	.0146	.0000	.0000	.11	.70	.....	...
592	June 13	V. slight	Slight	Dec. vg.	0.1	6.20	1.60	.0000	.0124	.0000	.0000	.11	.70	.....	...
593	June 13	V. slight	V. slight	Slight	0.15	5.50	2.10	.0006	.0072	.0000	.0000	.11	.70	.....	...
594	June 13	V. slight	V. slight	Veg.	0.15	6.10	1.70	.0006	.0126	.0000	.0000	.11	.70	... .	...
595	June 13	V. slight	V. slight	Veg.	0.15	6.70	1.70	.0006	.0108	.0000	.0000	.12	.70	.....	...
596	June 13	None	None	Veg.	0.15	6.20	1.60	.0000	.0112	.0000	.0000	.11	.70	.....	...
775	Sept. 4	None	None	Dec. vg.	0.1	4.30	1.50	.0000	.0102	.0000	.0000	.12	1.50	.....	...
13	Nov. 11	None	None	Sl. veg.	0.05	5.80	1.60	.0000	.0094	.0000	0000	.14	1.55	.....	...
966	1903 Jan. 1	None	None	Sl. veg.	0.12	5.40	1.60	.0000	.0086	.0000	0000	.17	1.50	.....	...
983	Jan. 12	None	None	Sl. veg.	0.05	.....	....	.....	.....	.0000	.0000	....	....	*	...
1078	Mar. 7	None	None	V. slight	0.05	.....	....	.0006	.0056	.0050	.0000	.15	1.80	. ..	...
1153	Apr. 21	Slight	Fine	Dec. vg.	0.05	2.90	1.40	.0000	.0030	.0000	.0000	.15	1.40	.....	...
1269	June 19	None	None	Sl. veg.	0.05	.....	....	.....	.....	.....	. ...	....	....	.027	...
1924	1904 May 6	Slight	Slight	Sl. veg.	0.05	3.10	1.60	.0006	.0054	.0000	.0000	.15	1.50	.....	...
2371	Sept. 15	None	None	Sl. veg.	0.05	3.80	0.90	.0000	.0044	.0000	.0000	.13	1.50	.....	†
2584	Dec. 13	V. slight	Slight	Slight	.05	2.3	1.3	.0000	.0114	.0000	.0000	.15	0.4	.....	†
3025	1905 July 27	None	V. slight	S. earthy	0.20	3.7	1.5	.0020	.0134	.0050	0000	.12	0.9	.....	...
3413	1906 Jan. 25	None	None	Sl. veg.	0.05	4.3	2.3	.0014	.0074	.0050	.0000	.15	0.6	.....	...
3457	Feb. 14	....	.....	....	....	.....	....	.....	.....	.....	.....	....	...	0.000	...
3918	Aug. 31	None	V. slight	S. musty	0.05	3.0	1.5	.0006	.0084	.1000	.0000	.12	0.4	. ...	...
3999	Sept. 19	S. opal.	V. slight	Slight	0.10	3.2	1.2	.0020	.0100	.0050	.0000	.15	0.4	....	...

* Lead present in traces only.

† B. Coli present.

Chemical Analysis of Merrimack River at Concord.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1958	1904 May 16	Slight	Much floc.	Sl. veg.	0.35	3.00	1.70	.0000	.0066	.0050	.0000	.15	1.20	....	..

Chemical Examination of Water from Well in Penacook Park.

3906	1906 Aug. 27	None	V. slight	Sl. veg.	0.10	8.2	4.6	.0010	.0016	.0050	.0000	.35	....	.....	‡
3992	Sept. 17	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	....	.....	†

Chemical Examination of Water from Well in White's Park.

3917	1906 Aug. 31	None	None	None	0.08	11.5	7.0	.0010	.0020	.2000	.0000	.97	....	.....	...

Chemical Examination of Water from New Hampshire State Hospital.

3680	1906 June 19	None	None	Slight	0.00	17.1	12.1	.0050	.0022	.2000	0001	1.65	5.1	.....	...
3911	Aug. 27	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	.....	†*a*
3912	Aug. 27	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	.....	†*b*

† B. Coli present.
‡ B. Coli present in two samples; *a* spring; *b* pond.

The Merrimack River does not constitute any part of the water supply for the City of Concord. The latter is taken wholly from Penacook Lake.

Thirty-three samples representing private sources were examined, of which 15 were found to be of good quality, 11 were reported as doubtful or in poor condition, and seven were condemned as unfit for use.

Conway.—No public supply. The Conway Aqueduct Company, under local management, supplies the village with water from a system of natural springs about 2½ miles from its center.

Chemical Examination of Water from Faucet of Conway Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2396	1904 Oct. 2	None	Slight	Sl. veg.	0.25	2.6	2.2	.0000	.0000	.0000	.0001	.07	0.9	..	*a*
2402	Oct. 2	None	Slight	None	0.20	6.8	3.4	.0000	.0000	.0000	.0000	.05	1.8	..	....
3050	1905 Aug. 4	None	None	S. earthy	0.10	2.6	1.1	.0000	.0024	.0050	.0000	.07	0.6	..	....
3405	Jan. 21	None	None	None	0.10	4.4	1.2	.0010	.0014	.0100	.0000	.12	0.3	..	....

Chemical Examination of Water Supplying North Conway.

3159	1905 Sept. 12	None	None	Slight	0.10	2.7	0.8	.0008	.0042	.0100	.0000	.07	0.3	..	....
3206	Sept. 29	None	None	Veg.	0.15	4.5	2.5	.0020	.0030	.0100	.0000	.05	0.6	..	*b*
3207	Sept. 29	None	None	Earthy	0.10	3.3	2.0	.0020	.0024	.0100	.0000	.05	0.1	..	**c*
3508	1906 Mar. 5	None	None	Veg.	0.05	2.4	1.0	.0008	.0034	.0100	.0000	.05	0.4	..	....
3714	June 28	None	None	None	0.10	2.5	1.0	.0026	.0020	.0050	.0000	.05	0.3	..	**c*
3715	June 28	None	V. slight	None	0.10	3.0	1.0	.0014	.0020	.0030	.0000	.05	0.3	..	**d*
3716	June 28	Slight	Consid. floc.	Veg.	0.40	8.3	1.7	.0192	.0800	.0000	.0000	.10	....	..	**e*
3750	July 14	.....	....	.....	....	.....	....	.....	.....	.....	....	....	....	..	*n e*

a Taken from reservoir; *b* reservoir No. 1; *c* reservoir No. 2; * B. Coli present; *d* reservoir No. 3; *e* Shingle Pond; *n* no B. Coli.

Examination of nine samples from private sources showed two to be good, three doubtful or in poor condition, one polluted and three containing an excess of lead.

Cornish.—No public water supply. All the families of this town depend upon wells, or water taken from springs through lead pipe, each family having a separate supply.

Croydon.—One private supply is from a spring, the water being brought one half mile through lead pipe, from which eight families are furnished. Most of the water is from private wells.

Dalton.—No public supply. Water is obtained from individual springs.

Danbury.—No public or private system of water works. Two private supplies were found to contain an excess of lead.

DANVILLE.—No public supply. The water supply of Danville is, in nearly every case, from a well near the house or underneath it. One private supply examined was found to be polluted.

DEERFIELD.—No public supply. One private supply examined was found of doubtful quality.

DEERING.—No public water supply. One polluted private supply was reported upon.

DERRY.—In 1890 Boston contractors built the Derry Water Works, consisting of about 40 wells driven to a depth of 50 feet. The water is pumped to a standpipe of 180,000 gallons' capacity.

Chemical Examination af Water from Faucet of Derry Water Works Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
794	1902 Sept. 4	None	Slight	V. slight	0.0	6.40	4.80	.0000	.0012	.0120	.0000	.60	3.10	....	..
1372	1903 July 24	None	None	S. musty	0.0	7.00	3.60	.0000	.0010	.1500	.0000	.65	2.30	....	..
1532	Sept. 2	None	V. slight	None	0.1	12.40	6.80	.0000	.0038	.0700	.0000	.55	2.40	....	..
1946	1904 Mar. 10	None	None	S. veg.	0.05	6.90	4.90	.0000	.0014	.1500	.0000	.65	2.60	....	..
2676	1905 Feb. 1	None	None	None	0.00	8.7	6.5	.0000	.0000	.1000	.0000	.72	2.6	....	..
3068	Aug. 9	None	None	Slight	0.00	8.0	4.7	.0000	.0008	.0850	.0000	.62	2.7	....	..
3362	1906 Jan. 4	None	None	None	0.05	7.5	4.8	.0006	.0024	.1000	.0000	.25	2.9	....	..
3855	Aug. 17	None	V. slight	S.earthy	0.20	7.0	4.0	.0006	.0064	.0050	.0000	.55	2.2	....	..

Two private supplies examined were found to be polluted, and one of these also showed an excess of lead.

DORCHESTER.—No public supply.

DOVER.—A public water supply was installed by the City of Dover in 1888. The area of the pond from which the supply is taken is, when full, 78¾ acres; when drawn down six feet deep, 69½ acres. There are no measurable streams of water flowing into the pond, it being fed mainly from underground sources. The water is pumped to a reservoir of a capacity of 2,085,452 gallons when at a height of 14 feet.

During the past year a system of springs has been added to the supply, the water from this source now constituting about 90 per cent. of the present total daily pumpage of 800,000 gallons. (See special report on *the Dover supply*, given elsewhere.)

There are 26 miles of pipe, cast-iron mains, and cement-lined wrought iron service. (See special report.)

Chemical Examination of Water from the Dover Water Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Iron.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1901														
246	Nov. 4	None	None	Faint	0.0	5.50	2.40	.0010	.0080	.0000	.0000	.19	....	....	...
	1903														
985	July 13	None	None	S. fishy	0.1	7.00	2.40	.0000	.0036	.0000	.0000	.30	1.80	....	...
1256	July 20	Slight	Floc. veg.	V. dec. veg.	0.1	6.20	2.50	.0010	.0146	.0000	.0000	.25	1.10	....	...
1422	Aug. 10	Marked	Much floc	Veg.	0.1	7.30	2.00	.0000	.0084	.0000	.0000	.37	1.60	....	...
	1904														
2031	June 9	Marked	Much floc veg.	S. earthy	0.1	4.50	2.90	.0008	.0084	.0000	.0000	.30	2.40	....	...
2035	June 9	Marked	V. much red.	None	0.05	5.50	4.10	.0006	.0042	.0000	.0000	.30	2.80	....	...
2037	June 9	Slight	Slight	Slight	0.05	5.20	2.80	.0006	.0086	.0000	.0000	.30	2.60	....	...
2150	July 12	Slight	Much floc	Dec.	0.05	4.10	2.30	.0000	.0092	0000	.0000	.28	1.60	....	*
2151	July 12	Marked	Consid.	musty V.m'rk'd ar'matic	0.8	4.30	2.70	.0010	.0074	0000	.0000	.25	2.60	....	*
	1908														
1420	Aug. 10	Marked	V. much floc.	Veg.	.04	6.20	3.00	.0054	.0056	.0800	.0000	.38	2.80	....	*a*
	1904														
1994	May 27	Slight	V. much red floc.	V. slight	.08	4.60	3.20	.0022	.0040	.0100	.0000	.43	1.60	....	* *a*
	1905														
2671	Jan. 30	None	V. slight	Veg.	0.15	5.6	3.6	.0000	.0084	.0100	.0000	.35	0.9	....	...
3170	Sept. 15	Consid.	Con. fer.	Earthy	0.25	7.4	6.4	.0114	.0154	.0150	.0000	.42	3.1	....	*b*
3172	Sept. 14	Mod. op.	Mod'rate	Earthy	0.45	7.2	4.7	.0028	.0084	.0200	.0000	.57	1.5	....	* *c*
3281	Nov. 1	Opal.	Consid. earthy	None	0.10	5.4	4.4	.0014	.0024	.0050	.0000	.57	1.4	....	*d*
3282	Nov. 1	None	S. floc.	None	0.05	5.8	4.6	.0000	.0044	.0050	.0000	.57	1.5	....	*e*
	1905														
3283	Nov. 1	Slight	Con. fer.	Veg.	0.15	8.0	6.3	.0144	.0034	.0050	.0000	.50	1.6	....	*f*
3340	Dec. 18	S. opal.	Con. fer.	Veg.	0.05	7.0	4.7	.0110	.0074	.0150	.0000	.65	1.8	....	...
	1906														
3487	Feb. 28	Mod. op.	None	S. veg.	0.05	9.0	6.5	.0006	.0048	.0150	.0000	.55	1.9	....	...
3558	Apr. 13	None	Ferrug.	None	0.20	10.6	8.2	.0014	.0144	.0200	.0000	.70	3.7	.. .	*g*
3559	Apr. 13	None	Con. fer.	Veg.	0.05	9.5	8.0	.0014	.0168	.0100	.0000	.68	3.7	....	*h*
3599	May 8	S. opal.	Heav. fer.	S. veg.	0.30	10.9	8.4	.0090	.0024	.0500	.0000	2.48	....	....	*i*
3600	May 8	None	V. S. floc.	M. foul	0.00	6.5	5.0	.0014	0010	.0100	.0000	.55	....	....	*j*
3602	May 8	V. S. op	Con. floc.	Foul	0.10	9.5	6.7	.0036	.0020	.0300	trace	1.52	....	....	*k*
3654	June 5	Opal.	Slight	None	0.10	12.6	9.0	.0014	.0140	.0050	trace	.60	3.6	....	*l*
3655	June 5	Opal.	Much fer.	S. veg.	0.13	11.0	8.5	.0012	.0040	.0050	trace	.60	3.2	....	*m*
	1906														
3695	June 21	Mod. op.	Con. fer.	S. veg.	0.10	15.5	10.7	.0102	.0044	.0250	.0009	2.50	4.7	1.25	*n*
3696	June 21	None	None	None	0.03	7.0	5.0	.0018	.0014	.0100	.0000	.65	2.7	0.57	*o*

Chemical Examination of Water from the Dover Water Supply.—Concluded.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Iron.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3697	June 21	None	V. slight	None	0.03	6.2	4.6	.0010	.0014	.0100	.0000	.65	1.6	0.10	*p*
3698	June 21	S. opal.	Mod. fer.	S. veg.	0.03	17.2	12.7	.0074	.0026	.0100	.0000	1.60	6.3	2.15	*q*
3699	June 21	S. opal.	S. ferrug.	None	0.03	11.0	8.0	.0052	.0026	.0100	0000	.90	3.6	1.44	*r*
3700	June 21	V. light	Mod. fer.	V. S.veg.	0.03	13.4	9.2	.0086	.0028	.0100	.0000	.90	4.6	1.19	*s*
3701	June 21	Mod'ate.	Con. fer.	V. s ight	0.03	12.8	9.3	.0094	.0024	.0050	.0002	.75	5.7	0.66	*t*
3743	July 11	None	Slight	M. veg.	0.20	5.0	2.5	.0014	.0084	.0150	.0000	.25	0.6	....	*u*
3744	July 11	V. slight	Slight	Veg.	0.20	4.1	2.5	.0018	.0090	.0100	.0000	.25	0.6	....	*v
3754	July 16	None	None	None	0.10	3.5	1.8	.0008	.0048	.0050	.0000	.20	0.1	...	*w*
3836	Aug. 13	None	None	None	0.05	2.8	2.3	.0010	.0060	.0100	.0000	.22	0.4	....	*w*
3941	Sept. 6	None	Mod. earthy	None	0.05	5.7	3.0	.....	.....	.0200	.0000	.50	1.4	....	*x*
3942	Sept. 6	V. slight	Mod. fibrous	Veg.	0.05	7.0	4.7	.....	.....	.0100	.0000	.72	2.2	....	*y*

* B. Coli present.

a Brook in Hussey field; *b* Easterly Brook; *c* Westerly Brook; *d* west branch new collecting gallery; *e* spring near catch basin; *f* east branch of new collecting gallery; *g* tap at Wentworth Home; *h* weir at receiving basin; *i* catch basin No. 2 on long line; *j* Cate spring house; *k* catch basin No. 1 on short line; *l* hot water tap, C. F. Sawyer's residence, water shows alkalinity of 0.4 parts; *m* cold water tap, C. F. Sawyer's residence, water shows *acidity* of 0.4 parts; *n* catch basin No. 4 on long branch, shows an *acidity* of 0.5 parts; *o* catch basin No. 5 on long branch, alkalinity 0.2 parts; *p* catch basin No. 6 on long branch, alkalinity 0 9 parts; *q* catch basin No. 8 short branch, *acidity* 0.9 parts; *r* receiving well at spring pump house, alkalinity 0.05 parts; *s* weir at main receiving basin, *acidity* 1.1 parts; *t* tap at Coleman's stable, *acidity* 0.3 parts; *u* tap in pumping station at pond; *v* Willard Pond; *w* Kelly spring; *x* well in Hussey field; *y* weir at receiving basin, spring water.

Examination of eleven private supplies showed four to be of good quality, two doubtful quality, and five polluted.

Dublin.—No public supply. There are but very few wells in use at the present time in the town. The supply is very largely from springs and from the lake, which is fed by springs. There are five hydraulic rams and as many windmills, and several engines in use to pump water to the hilltops, where the summer residences are. Of ten private supplies examined four were good, one doubtful, three polluted, and two contained much lead.

Dummer.—No public supply. Water is obtained chiefly from springs, wells and aqueducts. One private supply examined and found good.

Dunbarton.—A private supply, inaugurated in 1904, furnishes water to three families and one public watering place from a spring excavated five feet deep in gravel. There is a standpipe of 100 barrels' capacity,

from which the water is distributed through 1,300 feet of galvanized iron pipe, service and mains. The remainder of the families are supplied from private wells and springs. Of ten private supplies examined three were found good, three doubtful or in poor condition, three polluted, and one showed much lead.

DURHAM.—Water is furnished by a private company incorporated in 1895, from wells dug about 20 feet deep, through clay. The water is pumped to a standpipe of 75,000 gallons' capacity. The mains are of galvanized iron, about two miles, with lead service pipes. Fifty families, which comprize practically the whole village, take this water. There are no private wells within this area. There are wells in town to which the public have access.

Chemical Examination of Water from Faucet of Supply of C. H. Pettee.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
784	1902 Sept. 8	None	None	None	0.0	15.20	9 50	.0012	.0028	.3500	.0003	.58	5:50	....	..
1360	1903 July 21	Marked	Fine floc.	V. slight	0.15	12.80	6.70	.0000	.0000	.0500	.0001	.65	4.50	....	..
1981	1904 May 24	Slight	None	None	0.0	15.20	6.90	.0000	.0016	.2200	.0000	.60	4.70	....	..
2693	1905 Feb. 10	None	V. slight	None	0.10	10.60	7.9	.0110	.0010	.0500	.0000	.65	4.2	....	..
3099	Aug. 20	Mod. op.	Mod.	None	0.00	9.3	7.3	.0020	.0034	.0500	.0004	.33	....	....	*
3100	Aug. 20	S. opal.	Slight	S. veg.	0.00	13.4	11.0	.0024	.0022	.0750	.0030	.56	....	....	*
3395	1906 Jan. 15	None	None	M. veg.	0.00	9.2	5.5	.0006	.0044	.0250	.0010	.52	2.3	....	..

* Colon B. present.

Six private supplies examined, one being found of good quality, the balance polluted.

EAST KINGSTON.—No public water supply.

EASTON.—No public supply. Water is obtained from individual wells and springs.

EATON.—No public water supply.

EFFINGHAM.—No public supply.

ELLSWORTH.—No public supply. Water is obtained wholly from private springs and wells.

ELKINS.—No public supply. Two private supplies were examined, one being found of good quality, the other polluted.

ENFIELD.—The Enfield Village Fire District Water Works, built in 1902 and 1903, by Arthur W. Stone of Hartford, Vt., is owned by the precinct. The source of the supply is a pond of 21 acres in area, and an average depth of about eight feet, fed by springs. The watershed is about 2,000 acres, principally cleared land, with only two families living near. The water flows by gravity through four miles of iron pipe. Service pipes are lead. From one fourth to one third of the population are supplied from this system, with additional connections being made each week.

There are also two private systems of water works in town: The Mascoma Aqueduct Company, whose plant was built in 1884. This supply is from a spring two feet in depth, which supplies about 1,000 gallons daily. This is a gravity system, with one mile of lead main pipe, and also lead service pipe. Ten families are supplied with this water, but some of them also have the town water.

The other private system was built by the Enfield Aqueduct Company in 1854, the source being a well 16 feet deep. This, also, is a gravity system with three fourths of a mile of cement-lined lead pipe for a main, and lead service pipes. The average daily consumption from this system is 1,320 gallons, by 40 families, but the town water is also supplied to some of these patrons.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2075	1904 June 20	V. slight	Slight	Dec. vg.	0.45	.....	....	.....	.....	.0000	.0000	.15	4.10	....	a
2411	Oct. 6	None	None	S. veg.	0.50	6.6	3.0	.0014	.0200	.0250	.0000	.05	1.2	....	a
2919	1905 June 19	None	None	S. veg.	0.40	5.5	2.7	.0000	.0116	.0200	.0000	.12	1.6	....	a
3095	Aug. 18	V. slight	None	S. veg.	0.50	5.7	2.7	.0020	.0152	.0100	.0000	.10	1.8	....	a
3368	1906 Jan. 5	V. slight	None	None	0.40	4.5	2.2	.0016	.0074	.0050	.0000	.07	2.0	....	a
3790	July 30	None	Slight	Veg.	0.40	4.8	2.0	.0022	.0168	.0000	.0000	.05	1.6	....	*a
3079	1905 Aug. 14	Slight	Consid. earthy	Slight	0.00	4.3	3.0	.0000	.0000	.0100	.0000	.07	0.7	...	b
3372	1906 Jan. 5	None	None	None	0.00	6.2	3.2	.0006	.0016	.0080	.0000	.05	1 1	....	b
3369	Jan. 5	None	None	None	0.00	11.0	8.2	.0010	.0038	.0750	.0000	.62	6.3	.015	*c
3790	July 30	None	S. fine	Veg.	0.4	4.8	2.0	.0022	.0168	.0000	.0000	.05	1.6	....	a

*B. coli present, but absent from second sample.
a Tap, Village Fire District Water Works.
b Tap, Mascoma Aqueduct Company.
c Tap, Enfield Aqueduct Company.

Of four private supplies examined, two were found to be polluted and two contained much lead.

EPPING.—Water for this town is furnished by private wells and springs. River water is furnished by the Village District Water System for use at the box shop, and several families have it for washing purposes. Examination of two private supplies showed one to be of good quality, the other polluted.

EPSOM.—No public water supply operated by town or private company. Examination of three private supplies showed all to be polluted.

ERROL.—A few families obtain water from the well of Mr. L. C. Braggs, which was analyzed at the State Laboratory of Hygiene and pronounced to be first-class water.

The greater part of the town is supplied with water from brooks and springs on the hillsides, nearly every family having running water to their homes. The water at the hotel is pumped into a large reservoir from Clear Stream, which is fed by brooks and streams in the mountain-side.

EXETER.—No public supply. The Exeter Water Works, owned by a private company were installed in 1886. The source of the supply is an artificial pond fed by springs and brook.

Chemical Examination of Water from Faucet of Supply of Exeter Water Works.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
749	1902 Aug. 26	V. slight	Decided red floc.	Marked veg.	0.5	7.80	2.80	.0000	.0202	.0000	.0000	.87	2.80	....	..
1358	1903 July 20	None	Floc.	V. slight	0.4	8.20	1.50	.0000	.0096	.0000	.0000	.30	2.20	....	..
1959	1904 May 16	Marked	Much fine	Sl. veg.	0.5	6.70	3.60	.0000	.0144	.0050	.0000	.32	3.20	....	..
2209	July 26	Marked	V. much red floc.	Slight aromat.	0.5	7.50	4.70	.0006	.0108	.0050	.0000	.42	4.70	....	..
2670	1905 Jan. 30	Consid.	Slight	Dec. vg.	0.50	8.5	5.0	.0080	.0084	.0150	.0000	.45	2.4	....	..
3076	Aug. 14	Slight	S. ferrug.	M. veg.	0.30	9.2	5.5	.0000	.0124	.0050	.0000	.45	2.8	....	..
3381	1906 Jan. 9	Slight	Slight	Veg.	0.60	5.0	4.3	.0044	.0064	.0100	.0000	.57	2.3	....	..

Six samples representing private supplies were examined, of which three were found to be of doubtful quality or in poor condition, and three were polluted.

FARMINGTON.—The town owns and operates a water supply from two springs 12 feet deep. The water is distributed from a reservoir.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
853	1902 Oct. 10	None	Slight	V. slight	0.0	5.9	3.0	.0000	.0020	.0200	.0000	.45	3.0	....	..
3092	1905 Aug. 17	None	V. slight	None	0.0	17.0	11.3	.0030	.0010	.2500	.0010	3.15	4.4	....	*
3477	1906 Feb. 20	None	S. fibrous	None	0.0	15.3	12.3	.0014	.0014	.5000	.0005	2.52	4.4	....	..

* B. coli present.

Two private supplies examined proved to be of good quality.

FITZWILLIAM.—Water in this town is from private wells and springs. Examination of 11 such supplies showed three good, two doubtful, four polluted and two with an excess of lead.

FRANCESTOWN.—A private supply, inaugurated 25 years ago, is from a spring. The watershed is cleared, but no inhabitants. Wells are excavated 12 feet deep, and the water flows by gravity through half a mile of iron enameled pipe, both service and mains. Twenty families have this water, one tenth of the population. There are private wells within this area.

Chemical Examination of Water from Spring Reservoir.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
783	1902 Sept. 6	None	None	V. slight	0.00	8.5	4.0	.0000	.0000	.3000	.0000	.10	2.7	....	..
3084	1905 Aug. 15	None	None	None	0.07	7.0	4.6	.0008	.0008	.0920	.0000	.15	1.8	.. .	*

* B. coli present.

Two samples representing private supplies were found of good quality.

FRANCONIA.—No public supply. A private company, known as the Franconia Water Supply Company, in 1888 or 1889, introduced a water supply from a spring a mile and a half distant.

Chemical Examination of Water of the Franconia Water Supply Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
387	1902 Feb. 1	None	Floc.	Earthy veg.	0.2	5.90	1.30	.0000	.0086	.0210	.0000	.10	1.30	....	..
1357	1903 July 19	None	None	None	1.0	6.70	2.00	.0000	.0000	.0200	.0000	.05	1.80	....	..
2678	1905 Feb. 1	None	M. fine	None	0.05	6.1	3.9	.0000	.0000	.0600	.0000	.25	1.6	....	..
3390	1906 Jan. 11	None	S. fine	S. veg.	0.10	7.3	4.8	.0010	.0026	.0300	.0000	.30	2.2	....	..

FRANKLIN.—The Franklin Water Works, owned by the city, were built in 1891. The source is springs and wells. There is a covered reservoir about twenty feet deep. During certain portions of the year the supply from the springs is insufficient, and it has been the custom to draw directly from the river. An extension of the system is necessary if danger from use of the polluted river water is to be avoided. (See special report given elsewhere.)

Chemical Examination of Water from Faucets of Franklin Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
78	1901 July 24	None	None	None	0.0	3.90	2.70	.0036	.0052	.0200	.0000	.14	....	.0100	...
337	Dec. 20	None	None	S. veg.	0.05	3.40	2.10	.0008	.0034	.0400	.0000	.18	.8	.....	...
338	Dec. 20	None	None	S. veg.	0.05	4.00	2.40	.0014	.0050	.0220	.0000	.16	.8	.....	*a*
339	Dec. 20	None	None	S. veg.	0.05	4.40	1.40	.0026	.0054	.0760	.0000	.30	.8	.....	*b*
804	1902 Sept. 15	None	None	None	0.0	6.50	3.30	.0000	.0016	.0200	.0000	.27	2.0	.....	...
849	Oct. 8	None	None	None	0.0	.....	....	.....	.....	.0200	.0000	....	....	.000	...
870	Oct. 15	None	None	None	0.0	.....	....	.....	.....	.0300	.0000	.17	....	.0870	...
986	1903 Jan. 14	None	None	S. veg.	0.0	9.10	3.20	.0000	.0010	.0200	.0000	.15	1.20	.000	...
1166	Apr. 27	None	None	None	0.0	3.60	1.60	.0000	.0000	.0100	.0000	.15	1.60	.0560	...
1288	July 1	None	None	S. veg.	0.0	6.20	2.20	.0000	.0016	.0200	.0000	.15	1.80	T.	...
1351	July 20	None	None	None	0.0	4.40	2.60	.0000	.0014	.0000	.0000	.20	1.40	.....	...
1599	Oct. 15	None	None	V. slight	0.0	5.10	1.20	.0000	.0040	.0800	.0000	.15	1.10	.0400	...
1699	Nov. 24	None	None	Aromat.	0.0	3.50	2.00	.0006	.0070	.0000	.0000	.20	1.20	.0080	...
1700	Nov. 24	None	None	Slight aromat.	0.0	3.80	2.60	.0000	.0040	.0000	.0000	.70	1.20	.....	*c*
1701	Nov. 25	None	Consid. floc.	None	0.0	10.20	7.90	.0000	.0020	.3000	.0000	.70	3.20	.....	*c*
1702	Nov. 24	None	None	None	0.05	4.20	2.70	.0010	.0060	.0000	.0000	.20	1.80	.0180	...
1724	Dec. 15	None	None	S. veg.	0.0	4.90	3.00	.0000	.0012	.0400	.0001	.80	1.90	.....	...
1725	Dec. 15	Marked	Much floc. veg.	V.S. veg.	0.05	3.40	1.60	.0020	.0070	.0100	.0000	.15	1.50	.....	...
1754	Dec. 22	V. slight	None	S. veg.	0.1	3.80	2.50	.0000	.0014	.0000	.0000	.25	1.60	.0090	...
1812	1904 Jan. 25	Slight	Slight	S. earthy	0.0	2.60	1.40	.0020	.0048	.0000	.0000	.05	1.00	.....	*†
1815	Jan. 25	None	None	None	0.0	2.60	1.60	.0014	.0022	.0000	.0000	.05	1.10	.....	‡
1842	Feb. 18	Slight	Floc. veg.	None	0.0	2.60	1.80	.0008	.0032	.0000	.0000	.15	1.40	.....	§
1843	Feb. 18	None	V. slight	None	0.0	2.90	2.10	.0006	.0014	.0000	.0000	.20	1.20	.....	*b**
1844	Feb. 18	None	S. veg.	None	0.0	3.00	2.00	.0006	.0016	.0050	.0000	.15	1.80	.....	*a*
1879	Mar. 29	Slight	V. slight	S. veg.	0.1	4.80	2.10	.0006	.0022	.0800	.0000	.15	1.60	.....	...
1922	May 5	None	None	S. veg.	0.05	5.20	3.00	.0024	.0026	.0250	.0000	.20	1.85	.....	...
2093	June 27	Slight	None	V. slight	0.0	2.50	.90	.0010	.0024	.0000	.0000	.20	1.00	.....	...
2435	Oct. 12	None	None	V. slight	0.00	3.8	2.7	.0000	.0010	.0000	.0000	.20	1.8	.....	*
2459	Oct. 20	None	S. floc.	None	0.00	4.9	3.7	.0016	.0016	.0000	.0000	.27	2.0	.....	**d*
2460	Oct. 20	None	None	V. slight	0.00	4.4	3.4	.0000	.0014	.0000	.0000	.22	1.8	.....	*
2540	Nov. 15	None	None	V. slight	0.05	4.3	3.5	.0000	.0000	.0250	.0000	.22	1.1	.....	*e*

Chemical Examination of Water from Faucets of Franklin Town Supply.—Continued.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2544	1904 Nov. 16	None	None	None	0.00	4.5	2.7	.0000	.0000	.0350	.0000	.22	1.1	.....	*e*
2550	Nov. 18	Slight	S. fine	M. veg.	0.00	4.8	3.3	.0000	.0000	.0800	.0000	.22	1.4	.....	*f*
2589	Dec. 12	None	None	S. earthy	0.00	7.5	6.0	.0000	.0010	.0150	.0000	.25	1.2	.....	*
2599	Dec. 19	None	Consid. fine	S. earthy	0.00	6.0	3.0	.0000	.0000	.0400	.0000	.25	1.6	.....	*f*
2600	Dec. 19	None	Consid. floc.	Slight	0.20	8.2	4.6	.0000	.0014	.0150	.0002	.12	1.6	.....	*g
2622	1905 Jan. 2	None	S. fine	S. earthy	0.00	4.3	3.0	.0000	.0000	.0280	.0000	.25	1.1	.....	...
2647	Jan. 17	Slight	M. floc.	None	0.25	4.8	3.5	.0000	.0000	.0150	.0000	.20	0.6	.....	*h*
2648	Jan. 17	Slight	Much	S. arom.	0.05	4.0	3.1	.0000	.0010	.0250	.0000	.20	0.4	.....	*i*
2649	Jan. 17	None	None	Slight	0.15	4.4	2.9	.0000	0024	.0100	.0000	.15	0.4	.....	*j
2650	Jan. 17	V. slight	Consid. floc.	Veg.	0.30	3.7	2.9	.0020	.0010	.0150	.0000	.17	0.9	.....	*k*
2683	Feb. 7	None	V. slight	None	0.05	9.2	6.9	.0000	.0000	.0550	.0008	.25	2.7	.....	*l*
2667	Jan. 30	Slight	S. floc.	V. slight	0.15	5.0	3.0	.0000	.0010	.0200	.0000	.15	1.4	.....	*m*
2694	Feb. 13	None	S. floc.	V. slight	0.00	4.0	2.8	.0010	.0010	.0300	.0000	.30	2.2	.....	*n*
2709	Feb. 20	Slight	M. floc.	S. foul	0.20	4.2	3.0	.0094	.0000	.0300	.0001	.22	0.6	.....	*o*
2747	Mar. 13	None	V. slight	S. musty	0.00	8.0	6.0	.0000	.0014	.0800	.0000	.85	3.1	.1100	*p*
2767	Mar. 27	None	M. floc.	S. earthy	0.05	4.0	3.1	.0000	.0000	.0280	.0000	.20	1.6	.....	*q
2768	Mar. 28	None	V. slight	S. veg.	0.05	5.3	3.4	.0000	.0000	.0280	.0000	.20	1.9	.....	*r*
2773	Mar. 29	Much	Consid.	S. musty	0.20	4.6	2.0	.0010	.0010	.0250	.0000	.20	1.2	.....	...
2778	Mar. 30	None	S. fine	Slight	0.10	4.9	3.4	0014	.0014	.0250	.0000	.20	1.6	.....	...
2782	Mar. 31	None	Consid.	S. earthy	0.10	4 5	3.0	.0000	.0000	.020	.0000	.20	1 6	.....	...
2784	Apr. 1	None	Consid.	None	0.10	4.5	2.6	.0014	.0000	.0200	.0000	.20	1.1	.....	...
2787	Apr. 3	None	Consid.	None	0.10	4.5	2.7	.0014	.0010	.0200	.0000	.20	1.1	.....	...
2789	Apr. 4	None	V. slight	None	0.05	4 5	3.0	.0014	.0010	.0150	.0000	.20	1.1	.....	...
2791	Apr. 6	Slight	Slight	None	0.30	4.8	1.9	.0000	.0054	.0150	.0000	.07	0.7	.....	*s*
2792	Apr. 6	Slight	Slight	Slight	0.10	4.2	2.3	.0000	.0014	.0150	.0000	.20	1.1	.....	...
2810	Apr. 24	None	Slight	None	0.10	4.0	2.3	.0000	.0014	.0150	.0000	.22	1.2	....	*
2837	May 10	None	V. slight	Veg.	0.00	5.8	3.8	.0000	.0000	.0250	.0000	.22	1.4	.....	...
2842	May 11	None	Consid.	V. slight	0.00	13.7	8.2	.0000	.0010	.0250	.0000	.25	6.2	.....	...
2847	May 13	Slight	S floc.	Slight	0.00	5.1	3.2	.0010	.0000	.0300	.0000	.20	1.1	.....	...
2849	May 15	None	V. slight	V. slight	0.00	5.1	3.1	.0000	.0000	.0300	.0000	.20	1.1	.....	...
2850	May 16	None	None	None	0.10	5.1	3.3	.0000	.0000	.0300	.0000	.20	1.1	.....	...
2853	May 17	None	V. slight	None	0.00	5.7	3.7	.0000	.0000	.0300	.0000	.20	1.2	.....	...

Chemical Examination of Water from Faucets of Franklin Town Supply.—Concluded.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2854	1905 May 18	None	V. slight	Earthy	0.00	5.7	2.8	.0010	.0000	.0200	.0000	.20	1.1	.....	...
2857	May 19	None	None	None	0.00	5.80	4.0	.0010	.0000	.0200	.0000	.20	1.2	.....	...
2859	May 22	None	M. floc.	V. slight	0.20	3.7	1.7	.0000	.0000	.0000	.0000	.20	0.4	.....	*t
2860	May 22	Slight	Slight	V. slight	0.05	9.7	6.2	.0000	.0000	.5000	.0000	.93	2.7	.....	*u
2862	May 22	None	Slight	Slight	0.05	5.1	3.4	.0000	.0000	.1000	.0000	.32	1.4	.....	*v
3046	Aug. 4	Slight	M. ferrug.	S. earthy	0.20	6.6	4.5	.0010	.0052	.0050	.0000	.35	1.9	.....	t
3047	Aug. 4	Slight	None	None	0.00	5.7	3.3	.0010	.0016	.0200	.0000	.22	1.2	.....	...
3196	Sept. 26	V. sligh	tV. slight	S. earthy	0.10	4.9	2.6	.0006	.0060	.0100	.0000	.22	1.8	.....	...
3202	Sept. 27	None	None	None	0.10	4.7	2.8	.0008	.0054	.0200	.0000	.22	1.8	.....	...
3231	Oct. 17	None	None	S. veg.	0.15	4.6	2.9	.0020	.0084	.0100	.0000	.22	1.5	.....	...
3245	Oct. 20	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	.....	*
3345	Dec. 23	None	None	Veg.	0.05	4.1	2.8	.0022	.0038	.0100	.0000	.20	1.9	.....	...
3347	Dec. 28	M. opal.	Con. floc.	M. veg.	0.18	9.1	7.0	.0040	.0034	.0250	.0010	.22	4.2	.....	w
3348	Dec. 28	V. slight	V. slight	S. veg.	0.05	6.0	4.5	.0008	.0030	.0250	.0000	.22	2.0	....	...
3355	1906 Jan. 2	None	None	None	0.00	4.8	3.5	.0010	.0034	.0250	.0000	.22	2.7	....	...
3366	Jan. 5	None	None	None	0.05	4.1	2.4	.0010	.0034	.0100	.0000	.22	1.5	.....	...
3375	Jan. 9	None	None	None	0.00	5.3	3.8	.0010	.0014	.0280	.0000	.22	2.0	.....	...
3401	Jan. 18	None	None	None	0.00	5.1	3.6	0010	.0054	.0200	.0000	.22	2.2	.....	...
3412	Jan. 25	None	None	None	0.05	5.3	3.6	.0010	.0024	.0200	.0000	.20	1.4	.....	*
3429	Feb. 1	None	None	None	0.00	5.3	3.2	.0008	.0010	.0200	.0000	.22	1.2	.....	...
3591	May 2	None	None	None	0.00	8.0	2.5	.0014	.0014	.0400	.0000	.22	1.4	.....	...
3876	Aug. 22	.....	.....	.....	....	.....	....	.....	... .	.....	.....	....	....	.....	x*
3877	Aug. 22	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	.....	y

a Sample taken from tap at pumping station; *b* sample taken from reservoir of sulfit spring; *c* auxiliary supply; † bacteria per c. c. (river water), 1460; ‡ bacteria per c. c. (do.), 1740; § bacteria per c. c. (do.), 1290; * B. coli present; *d* sulphite spring; *e* test well, No. 8; *f* driven well, No. 9; *g* river opposite No. 9 well; *h* Ward's Brook; *i* surface water near hemlock tree; *j* Webster Lake; *k* Giles Brook; *l* well, No. 4; *m* well, No. 16; *n* well, No. 5; *o* well, No. 7; *p* spring; *q* all the wells after being pumped 24 hours; *r* combined supply of four wells; *s* Pemigewasset River; *t* sulphite spring; *u* brick well; *v* wood covered reservoir; *w* large well; *x* Pemigewasset River; *y* sulphite spring.

Eighty-six samples representing private supplies were examined. Of this number, 37 were found to be of good quality, 15 doubtful or in poor condition, 15 were condemned as being unfit for use and 19 contained much lead.

FREEDOM.—No public supply. Some three fourths of the families in town are supplied with water from springs through iron and lead pipes. A few wells are still used. Four private supplies were examined and all found to be free from organic pollution, though one contained an excess of lead.

FREMONT.—No public or private water system.

GILFORD.—This is a farming town and all have wells or springs from which they get water.

GILMANTON.—The water supply is from private wells that have been dug and walled generally; a few have been driven, and there are a few families who take their water in pipes from living springs. The people are more careful than formerly in regard to drainage. There has been only one case of typhoid fever in the central part of the town in thirty years, and that was contracted elsewhere. Of five private supplies examined one was found good, one of doubtful quality, two polluted, and one contained lead.

GILSUM.—No public supplies. Several spring supplies are utilized by several families, although wells are chiefly depended upon for water. Of five private supplies received for analysis two were found of good quality, one doubtful, and two contained much lead.

GOFFSTOWN.—The present system was built in 1891 by the Goffstown Fire Precinct, Goffstown Village. The reservoir from which the water supply comes is situated between the Uncanoonuc Mountains and is surrounded by woodland. The reservoir is fed by springs in the bottom of the reservoir; by a brook, fed by springs flowing from the northeastern slope of the north mountain; and from a swamp flowing into the brook near the mouth of the reservoir. In addition to the above there is now being built a storage reservoir of larger capacity than this one; both are at the base of Uncanoonuc Mountains.

Seven samples representing private sources were examined. Of these two were found to be of good quality, one was polluted and four contained much lead.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
201	1901 Oct. 10	None	Floc. veg.	Dec.veg.	1.40	5.60	2.20	.0042	.0276	.0000	.0002	.17	....	....	..
795	1902 Sept.11	None	None	Dec.veg.	1.90	8.70	2.00	.0028	.0234	.0000	.0002	.11	2.00	....	..
1388	1903 July 29	Slight	Floc. veg.	Dec.veg.	1.1	8.00	1.10	.0014	.0202	.0000	.0000	.16	0.90	....	..
1962	1904 May 17	None	None	V. slight veg.	0.9	4.20	1.80	.0000	.0080	.0000	.0000	.13	1.70	...	..
2666	1905 Jan. 30	None	None	S. veg.	1.30	6.0	2.6	.0000	.0120	.0000	.0000	.15	0.7	....	..
3154	Sept. 9	None	None	Veg.	2.20	9.3	2.6	.0010	.0314	.0100	.0000	.10	1.5	....	..
3370	1906 Jan. 10	None	None	Veg.	0.80	4.8	2.0	.0014	.0024	.0100	.0000	.10	0.9	....	..

GORHAM.—No public supply. The Alpine Aqueduct Company, organized in 1873, furnishes water to 160 families, one half the population, from 19 springs, three to seven feet deep, stoned and covered.

One private supply was found of doubtful quality.

Chemical Examination of Water from a Faucet of the Alpine Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
799	1902 Sept.11	None	None	None	0.0	7.40	4.80	.0000	.0000	.0000	.0000	.10	1.90	....	..
1352	1903 July 18	None	None	None	0.0	5.80	1.20	.0000	.0014	.0000	.0000	.05	1.10	....	..
1957	1904 May 15	None	None	V. slight	0.0	4.80	3.70	.0014	.0080	.0000	.0000	.07	2.00	....	..
2672	1905 Jan. 30	None	None	None	0.05	6.0	4.3	.0000	.0000	.0200	.0000	.07	1.6	....	..
2813	Apr. 24	None	S. veg.	None	0.28	5.5	2.3	.0000	.0014	.0250	.0000	.15	0.7	....	*a*
2814	Apr. 24	None	Slight	None	0.28	4.5	2.4	.0000	.0022	.0000	.0000	.07	0.1	....	*b*
2815	Apr. 24	None	None	None	0.00	5.0	3.3	.0000	.0008	.0100	.0000	.15	0.7	....	..
2816	Apr. 24	None	V. slight	None	0.10	4.8	3.1	.0000	0010	.0000	.0000	.05	0.4	....	*c*
3204	Sept.27	None	Slight	None	0.10	5.1	3.1	.0007	.0020	.0100	.0000	.05	1.2	....	..
3385	1906 Jan. 10	None	None	None	0.00	4.4	2.7	.0014	.0010	.0100	.0000	.05	1.5	...	..

a Perkins Brook; b South Branch of Moose Brook; c Ice from Gulch Brook.

GOSHEN.—Water is obtained from private wells and springs dug through gravel, sand, loam, and rocks. Some of the wells are under buildings and receive much filth from surface drainage, sink drains, vaults and stables. Two private supplies examined during the past two years were found to be of good quality, though one contained an excess of lead.

GRAFTON.—The water supply is from private springs and wells dug from 12 to 60 feet deep, through gravel. Both lead and iron pipe is used. Of five private supplies examined three were found good, one polluted, while two of this number showed much lead.

GRANTHAM.—No public supply. Water is obtained entirely from private wells and springs.

GREENFIELD.—There is no public water supply. Water is obtained from wells dug four or five feet deep, in sandy soil, and flows by gravity one eighth of a mile through lead pipe. In two instances two or three families have shared the expense and have the same supply. Of two private supplies examined one was found good, the other in a polluted condition.

GREENLAND.—With but one or two exceptions each farm has its private well. A few small places use filtered cistern water. Six families use spring water, brought to the house by means of a hydraulic ram. The springs are shallow, with sandy bottom; wells are dug, with the exception of two or three driven wells, the depth varying with the location. The situation of some of the wells, as regards sink-drains, cow-yards and privy vaults, is not of the best, so that after heavy showers and rains surface waters have caused a change in the character of the water. Two private samples examined: one found of good quality, the other polluted.

GRASMERE.—Two samples received from private sources were found to contain much lead.

GREENVILLE.—The town owns and operates a small water supply in the form of an artesian well 425 feet deep, ending in solid rock, and most of the distance below 125 feet in solid rock. The water is pumped to a brick reservoir of 20,000 gallons' capacity. There is one mile of wood main pipe, while the service pipes are of galvanized iron. Sixteen families and two schools take from this supply, 25 per cent. of the population. There are many private wells within this area, but none to which the public have access.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
753	1902 Aug. 27	None	None	None	0.00	12.40	8.7	.0000	.0000	.0200	.0000	.12	3.90	....	..
2699	1905 Feb. 14	Much	Slight	V. slight	0.10	11.5	10.0	.0020	.0000	.0000	.0000	.15	3.9	....	..
2970	July 10	V. slight	Slight	S. foul	0.15	12.3	9.9	.0008	.0016	.0120	.0000	.17	4.5	....	..
3135	Sept. 1	V. slight	S. opal.	Clayey	....	12.2	7.1	.0022	.0022	.0000	.0000	.16	4.0	....	..
3400	1906 Jan. 18	Heavy	Consid. ferrug.	None	0.50	17.8	13.5	.0014	.0074	.0050	.0005	.22	4.6	....	..
3417	Jan. 29	V. slight	None	None	0.10	13.3	8.5	.0014	.0034	.0050	.0001	.27	4.3	....	..
3649	May 31	M. opal.	None	Veg.	0.20	13.5	9.8	.0010	.0014	.0050	.0000	.10	....	....	..

Thirteen private supplies were examined. Of this number three were found of good quality, one doubtful, six polluted, and three contained an excess of lead.

GROTON.—No public supply. Water is obtained from individual springs and wells. Two samples received from this town were both found to contain considerable lead.

HAMPSTEAD.—Water supply is from wells. Of four supplies examined three were found polluted and one contained lead.

HAMPTON.—A company has a charter for a system of water works, to include the town and beach, but nothing has been done as yet toward building the plant.

Fourteen samples representing private supplies were examined. Of this number three were found good, one doubtful, nine polluted, and two contained much lead.

Chemical Examination of Water from Various Sources for Proposed Public Supply of Little Boar's Head.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
385	1902 Jan. 23	None	V. slight	Slight	0.00	7.4	4.9	.0012	.0064	.0400	.0001	.55	1.9	....	*a*
426	Mar. 1	V. slight	V. slight	Earthy	0.10	21.2	13.8	0080	.0148	.5000	.0000	1.17	5.1	....	*b*
427	Mar. 3	None	V. slight	Earthy	0.00	8.8	7.1	.0010	.0000	.0800	.0000	.52	1.9	...	*a*
3601	1906 May 4	V. slight	V. slight	Hay-like	1.4	9.2	4.7	.0044	.0084	.0100	.0000	1.12	....	....	*d*
3605	May 5	None	None	None	0.0	20.8	12.7	.0010	.0030	.0400	.0000	3.50	....	....	*b*
3608	May 5	V. slight	V. slight	Hay-like	1.4	8.5	6.0	.0020	.0194	.0100	.0000	1.05	....	....	*c*
3620	May 18	None	S. veg.	S. veg.	0.10	10.5	9.2	.0014	.0104	.0600	.0000	1.32	1.6	....	*e*
3663	June 4	V. slight	S. fibrous	Veg.	0.10	12.7	8.7	.0038	.0032	.0350	.0000	1.30	3.1	....	*e*
3664	June 4	None	Consid.	S. earthy	0.00	7.3	4.5	.0032	.0026	.0150	.0000	1.25	....	....	*f*
3703	June 16	V. slight	S. floc.	Foul	0.05	7.3	5.0	.0046	.0024	.0050	.0000	.85	....	...	*g*

a From spring; *b* well at Fox Head Point; *c* stream just beyond Nilus bridge near highway; *d* falling water from Jenkins' Mill; *e* Gill's Spring; *f* Lamphrey Spring; *g* driven well of Sarah Lamphrey.

HANCOCK.—The village is supplied from wells or springs located upon a hill to the east, in heavy granite, gravelly soil. It was voted at the last town meeting to establish a town water supply system, and a committee was chosen to carry the vote into effect, but nothing has been done as yet except to have the route of pipe line surveyed. The proposed supply has been analyzed at the State Laboratory of Hygiene.

One private supply was examined and found good.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3040	1905 Aug. 1	None	S. veg.	Con.veg.	0.30	5.0	3.0	.0008	.0072	.0300	.0000	.10	1.1	...	* *a*
3055	Aug. 6	None	V. slight	Slight	0.15	10.4	5.0	.0006	.0036	.0150	.0000	.10	1.1	...	* *a*
3123	Aug. 30	None	None	None	0.05	4.0	2.1	.0030	.0038	.0100	.0000	.06	....	...	* *b*
3391	1906 Jan. 15	None	S. coarse	None	0.10	3.8	2.2	.0010	.0064	.0100	.0000	.10	.03	...	*b*

* B. Coli present; *a* Weston Brook; *b* stream, proposed public supply.

HANOVER.—The Hanover Water Works, installed in 1893, is an impounded water in a large artificial pond. The bed of the pond was a fertile valley, which was not cleared of vegetation before impounding the water. The water has always been colored, rich in dissolved vegetable matter, with occasionally some little taste and odor, though usually not offensive.

During the summer of 1906 the reservoir has been nearly full continuously, and the quality of water more constantly good than ever before during the hot weather. The tributaries have been cleared and in part paved with stone; portions of the pond margin have been paved and considerable lengths of brook thoroughly cleared of all bushes and obstructing deposits. The sod of the original meadow long ago disintegrated, and the margins one foot from (below) full level line are clean and sandy.

The Hanover Water Works Company bought all the farms having houses within the drainage area, in March, 1903. Nearly all of these houses have been removed. One farm and house close to the eastern watershed line is still rented to a small family, but the location is such that it is not believed to be the slightest menace to the water supply.

A small beginning has been made toward reforesting the open spaces by setting out young spruces and pine seedlings.

So far as the cast iron mains have been bored into for connections they have been found remarkably free from rust. Lately a section of eight- and six-inch main was taken up and lowered, and the interior of the pipes removed appeared without noticeable rust nodules or any deposit.

The Hanover Aqueduct Association, a private corporation, furnishes a water that is used largely, though not exclusively, for drinking purposes. It is a normal spring water, the wells being eight or nine in number and dug to a depth of 10 to 20 feet, and yielding 4,000 gallons per day. There are very few individual wells in this locality.

There are about 100 taps in operation on this aqueduct. The main is two-inch lead pipe, and the service pipes are generally one-half inch lead; water served through pinhole gauges presumed to deliver 40 gallons daily.

Chemical Examination of Water from Supply of the Hanover Water Works Company.

Number.	Date of collection.	Appearance			Color.	Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.		Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
....	1893 Oct. 29	Marked	Much.....	.....	Faint yel. brown	8.10	4.00	.0170	.0240	.0000	.0000	....	2.90	....	*a*
....	Nov. 27	Marked	....	....		7.20	2.68	.0080	.0170	.0000	.0000	....	2.70	....	*b*
....	Dec. 29	Faint	.....	.....		6.08	3.16	.0038	.0178	.0000	.0000	.10	2.70	....	*c*
....	1894 Jan. 26	None	None	.....	0.7	8.50	....	.0088	.0224	.0000	.0000	.26	....	....	*d*
....	Feb. 8	None	None	Foul.....	0.7	8.50	4.60	.0010	.0132	.0000	.0000	.20	4.10	....	*e*
....	Mar. 8	None	None	Slight	0.3	10.00	5.70	.....	.....	.....	.....	.40	1.92	....	*f*
...	Apr. 10	Slight	.....	....	0.3	4.88	1.80	.....	.....	.0400	.0000	.16	....	....	..
....	Dec. 27	.....	.....	.....	0.7	.....	....	.0003	.0250	.0200	.0000	.05	2.99	....	*g*
....	1896 Mar. 20	.....	.....	.....	0.5	5.28	2.64	.0066	.0180	.0000	.0000	.10	1.43	....	..
798	1902 Sept. 11	V. slight	Slight veg.	V. dec. & earthy	0.55	8.80	3.30	.0020	.0230	.0000	.0000	.09	2.20	....	..
1353	1903 July 20	Marked	V. much floc.	V. mark. veg.	0.5	7.80	2.20	.0010	.0240	.0000	.0000	.10	2.20	....	..
1384	July 29	Marked	Floc. veg.	Decayed veg.	0.2	7.70	2.50	.0010	.0214	.0000	.0000	.07	2.00	....	..
1385	July 27	Marked	Floc. veg.	Decayed veg.	0.2	8.10	2.40	.0010	.0216	.0000	.0000	.07	2.10	....	..
1838	1904 Feb. 16	Slight	Fine floc.	V. slight	0.6	8.60	3.20	.0208	.0184	.0000	.0000	.10	2.60	....	..
1839	Feb. 16	Marked	Con. fine	Slight veg.	0.6	8.20	3.80	.0218	.0184	.0000	.0000	.10	2.70	....	..
1840	Feb. 16	Slight	Con. floc.	Veg.	0.6	.....	....	.0218	.0184	.0000	.0000	.10	2.70	....	..
1865	Mar. 9	Slight	Slight	Marked veg.	0.4	10.10	2.00	.0104	.0126	.0000	.0000	.10	2.20	....	*h*
1866	Mar. 9	Marked	Slight	Marked veg.	0.5	9.60	2.50	.0236	.0152	.0000	.0000	.15	2.20	....	..
1886	Apr. 4	V. slight	None	Marked veg.	0.3	4.90	2.40	.0000	.0036	.0000	.0000	.10	2.35	....	*i*
1887	Apr. 4	V. slight	None	Marked veg.	0.3	6.20	2.80	.0006	.0052	.0000	.0000	.10	2.40	....	*j*
3148	1905 Sept. 6	Slight	Slight	Veg.	0.50	8.3	3.6	.0016	.0160	.0200	.0000	.07	2.7	....	..
3267	Sept. 31	V. slight	V. S. fine	S. veg.	0.20	6.3	3.1	.0018	.0112	.0100	.0000	0.10	2.8	....	..
3268	Oct. 31	Slight	Slight	S. veg.	0.40	6.3	3.1	.0024	.0182	.0050	.0000	.10	2 8	....	..
3434	1906 Feb. 1	None	V. slight	None	0.35	7.0	3.3	.0026	.0094	.0050	.0000	.05	2.4	....	..

a Reservoir filling; *b* reservoir half full; *c* heavy thaw; *d* heavy thaw; *e* offensive; *f* heavy thaw; *g* sample from pipes; *h* filtered through sand filter; *i* filtered through sand filter, No. 1; *j* filtered through sand filter, No. 2.

We are indebted to Prof. Edwin J. Bartlett of Dartmouth College for the first nine analyses, which were made by him while the supply was

being introduced and the year following, when the water was in a bad condition.

Of five samples examined representing private supplies three were found of good quality, two polluted.

HARRISVILLE.—No public supply. Eighteen samples were received from various sections of the town. Of this number five were found to be of good quality, three doubtful or in poor condition, seven were polluted and seven contained an excess of lead.

HAVERHILL.—No public supply. The Haverhill Aqueduct Co., a stock company, built a system of water works for the town more than fifty years ago, the source of the supply being a spring. Water flows by gravity through a lead main and service pipes. The village of Woodsville in this town has a public system. For analyses of water see Woodsville.

Chemical Examination of Water from Faucets of Haverhill Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
771	1902 Sept. 3	None	None	None	0.0	6.10	3.90	.0000	.0000	.0300	.0000	.065	3.60	.....	..
1407	1903 Aug. 5	None	None	Slight	0.0	5.00	2.80	.0000	.0000	.0000	.0000	.05	2.70	.....	..
1960	1904 May 16	None	Con. fine	S. veg.	0.0	4.10	3.10	.0056	.0032	.0150	.0000	.08	2.70	.0700	..
1997	May 30	None	None	None	0.0	5.10	3.30	.0000	.0032	.0000	.0000	.10	2.60	.....	..
2536	Nov. 15	None	None	V. slight	0.05	5.3	3.6	.0000	.0030	.0175	.0000	.12	3.2	.....	..
2679	1905 Feb. 2	None	Slight	S. musty	0.05	6.2	3.8	.0000	.0000	.0200	.0000	.10	2.0	.....	..
3407	1906 Jan. 22	None	S. coarse	S. veg.	0.03	5.0	3.2	.0020	.0044	.0100	.0000	.10	2.3	trace	..

Of three private supplies examined one was found good, one polluted, and one contained much lead.

HEBRON.—No public supply. Water is obtained from individual wells and springs.

HENNIKER.—Water is from the private supplies of the Henniker Spring Water Company, installed in 1884, and the Dow System, installed in 1874. The sources are springs and wells. The wells, three in number,

are from 15 to 18 feet deep, with four springs used as feeders to them. The force is gravity, with four miles of galvanized iron main and service pipes. One hundred and thirty families, 95 per cent. of the population, take this water.

Chemical Examination of Water from a Faucet of the Henniker Spring Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
745	1902 Aug. 26	None	None	None	0.0	5.90	4.50	.0000	.0000	.0100	.0000	.07	2.60	....	..
3127	1905 Aug. 31	None	None	None	0.00	6.5	4.8	.0000	.0012	.0400	.0000	.15	....	....	..

Of eight private supplies examined four were found good, one of doubtful quality, and three polluted.

HILL.—No public supply. There are two private supplies in town. One owned by George A. Sumner, constructed in 1890, is taken from a stream about a mile long at the dam. The pond thus formed is about one half an acre in area and 10 feet deep. In 1893 a supply from a spring was introduced by Mr. F. R. Woodward. This spring flows about 50 gallons per minute; soil, sand and clay.

Chemical Examination of Water from a Faucet in Hill, Supplied by George A. Sumner's Water Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
786	1902 Sept. 9	V. slight	V. slight	S. veg.	0.25	8.70	1.50	.0000	.0036	.0000	.0000	.10	1.40	....	..
1207	1903 May 24	V. slight	V. slight	S. veg.	0.20	4.60	3.00	.0000	.0018	.0000	.0000	.10	1.40	....	..
2728	1905 Feb. 28	None	None	None	0.10	5.2	3.1	.0000	.0000	.0150	.0000	.12	1.4	....	..
3067	Aug. 9	.....	.....	.....	....	.. .	.....	.....	.....	.....	.....	....	....	....	*

* No B. Coli present.

Chemical Examination of Water from a Faucet in Hill, Supplied by F. R. Woodward's Water Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
761	1902 Sept. 2	None	None	None	0.0	6.00	2.50	.0000	.0028	.0700	.0000	.22	1.80	....	..
1208	1903 May 24	None	None	None	0.0	4.40	2.70	.0008	.0076	.1000	.0001	.25	2.60	....	..
2727	1905 Feb. 28	None	None	None	0.10	4.4	3.0	.0000	.0000	.0150	.0000	.12	0.4	....	..
3035	Aug. 1	None	None	Veg.	0.60	5.0	2.0	.0000	.0060	.0400	.0000	.05	0.9	...	*
3066	Aug. 9	Slight	M. floc.	S. veg.	0.15	6.6	4.2	.0006	.0064	.0150	.0000	.07	1.2	....	*
3111	Aug. 22	None	V. slight	Earthy	0.05	3.8	1.8	.0008	.0010	.0000	.0000	.10	....	....	*
3113	Aug. 22	None	V. slight	Slight	0.10	3.5	1.2	.0008	.0022	.0100	.0000	.11	....	....	*
3223	Oct. 10	None	V. slight	S. veg.	0.20	4.7	2.7	.0020	.0060	.0100	.0000	.05	1.1	....	*a*
3370	Dec. 22	.....	.....	.....	....	....	.....	.....	.....	.....	.....	....	....	....	*
3500	1906 Mar. 5	None	S. fine	None	0.15	1.9	1.4	.0006	.0054	.0050	.0000	.15	0.9	....	..
3718	July 2	None	None	None	0.20	4.2	1.6	.0014	.0070	.0350	.0000	.07	0.7	....	**
3956	Sept. 10	V. S. op.	Slight	Much	0.10	4.6	2.6	.0026	.0070	.0050	.0000	.15	1.1	....	*b*
3958	Sept. 10	None	S. fine	Slight	0.00	4.5	2.6	.0024	.0040	.0050	.0000	.15	1.1	....	..

* B. Coli present; *a* reservoir; ** check sample also shows B. Coli; *b* stream just above Woodward reservoir.

Eleven private supplies examined, three being found good, one polluted, and seven containing excessive quantities of lead.

Hillsborough.—The Hillsborough Bridge Village Fire Precinct owns a water supply, instituted in the autumn of 1886. The source is a pond of about 500 square acres; average depth about 15 feet; bottom, sand and ledge, with natural deposit. The water flows by gravity to intermediate reservoir of 500,000 gallons' capacity. The total length of mains is eight miles, cast iron and cement-lined iron pipe; service pipes mostly galvanized iron. Practically the entire population of the precinct are supplied with this water. There are a few private wells within the area reached by the public supply.

Chemical Examination of Water from Faucet of the Hillsborough Bridge Village Fire Precinct.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
746	1902 Aug. 20	None	None	None	0.2	3.70	1.30	.0000	.0060	.0120	.0000	.12	1.20	....	..
1374	1903 Aug. 27	Slight	Floc. veg.	V. slight	0.2	5.10	1.10	.0000	.0080	.0000	.0000	.08	0.90	....	..
1781	1904 Jan. 4	Slight	Slight	Slight	0.15	3.10	2 00	.0000	.0072	.0000	.0000	.12	1.50	...	..
1967	May 17	V. slight	Slight	None	0.05	3.60	1.90	.0000	.0080	.0000	.0000	.05	1.60	...	..
2685	1905 Feb. 8	None	None	Arom.	0.1	4.2	2.0	.0000	.0076	.0000	.0000	.12	0.4	....	..
3156	Sept. 12	None	None	Earthy	0.15	4.5	2.3	.0006	.0116	.0100	.0000	.07	0.9	....	..
3398	1906 Jan. 17	None	S. fine	S. earthy	0.30	3.7	1.3	.0010	.0050	.0050	.0000	.07	0.9	....	..

Eleven samples representing private supplies were examined. Of these four were good waters, one was of doubtful quality, four were found to be polluted, and two contained an excess of lead.

HINSDALE.—No public supply. Six private supplies examined showed two of doubtful quality, while four were found to be polluted.

HOLDERNESS.—No public water supply.

HOLLIS.—No public or private water supplies. Four waters received from this town were all found to be polluted.

HOOKSETT.—There are no incorporated companies, but two private supplies, one from Pinnacle Pond, and the other from a brook which has been dammed. Both are gravity systems, employing about two miles of iron pipe, service and mains, and supplying about fifty families—five per cent. of the population. There are many private wells within this area, but none to which the public have access.

Chemical Examination of Water from Various Sources in Hooksett.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
865	1902 Oct. 16	V. slight	Floc.	Veg.	0.9	4.60	1.40	.0000	.0114	.0000	.0000	.17	1.30	....	*
866	Oct. 16	None	None	S. veg.	0.0	3.40	1.20	.0000	.0042	.0000	.0000	.17	.90	...	†
2569	1904 Dec. 5	V. slight	M. floc.	S. veg.	0.0	2.4	2.0	.0000	.0050	.0050	.0000	.15	0.4	....	†
3399	1906 Jan. 18	V. slight	V. slight	S. veg.	0.0	3.4	2.1	.0010	.0050	.0050	.0000	.15	0.7	....	†

* From supply of Mrs. M. C. Towle. † From Pinnacle Pond Supply (H. C. Carbee).

Two private supplies were examined and both found polluted, one of these also containing much lead.

HOPKINTON.—The water works of the Hopkinton Village Aqueduct Association, incorporated, were built about 1841. The water is from wells dug from eight to fifteen feet through sandy loam, sandy gravel, and hardpan, and flows continually, by gravity, to the consumers. There is about three fourths of a mile of cement-lined iron main pipe, with lead service pipes. Forty-three families—about seventy per cent. of the fire district—have this water.

Besides the above families, who have constantly running water, this company supplies a public drinking fountain, the hotel, schools, town and lyceum halls, and public library.

Chemical Examination of Water from Supply of Hopkinton Village Aqueduct Association.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
876	1902 Oct. 16	None	None	None	0.0	8.90	4.20	.0000	.0000	.0300	.0000	.15	1.60	....	..
2146	1904 July 10	None	None	None	0.0	3.60	1.40	.0014	.0008	.0500	.0000	.15	1.40	....	..
3147	1905 Sept. 6	None	S. floc.	V. slight	0.15	8.0	4.2	.0008	.0020	.0250	.0000	.25	1.9	....	..

Seven samples representing private supplies were examined. Three of these were of good quality, two were polluted, and two contained much lead.

HUDSON.—No public supply. The Hudson water works, owned by a private company, were built in 1892. The source of the supply is a well 20 feet deep and 22 feet wide, dug through loam and gravel. The water is pumped to a standpipe 12 feet in diameter and 60 feet high.

Chemical Examination of Water from Well Supplying Town of Hudson.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
69	1901 July 16	None	S. floc.	None	0.0	6.00	3.70	.0014	.0026	.1000	.0000	.40	....	....	..
2744	1905 Mar. 7	None	Slight	None	0.0	5.6	4.4	.000	.0000	.0300	.0000	.37	2.0	....	..
2991	July 18	None	S. floc.	None	0.3	6.0	3.8	.0014	.0060	.0100	.0000	.30	1.6	....	..
3416	1906 Jan. 26	None	None	S. veg.	0.0	6.2	4.2	.0010	.0028	.0300	.0000	.30	1.9	....	..

Six private supplies examined; one found good, two of doubtful quality, three polluted.

JACKSON.—C. W. Gray & Co. installed a private water supply in 1904. The source is a stream of about 1,000 acres watershed, all wooded, no inhabitants. The water is of excellent quality, taken from a mountain stream about two miles from the village. There is a pressure of about eighty pounds per square inch. About three miles of iron service and wrought iron service pipe is employed in this system. Fifteen families—50 per cent. of the population—are supplied.

Of four private supplies examined, one was found of good quality, two were doubtful or in poor condition, and one was polluted.

JAFFREY.—The town instituted a system of water works in 1902, the source being a pond in Rindge having an area of 40 acres, an average depth of 20 feet, with hardpan bottom. The water flows by gravity through nine miles of 12-inch, cast-iron distributing mains; service-pipes, six-inch cast iron.

Nine private supplies were examined. Of this number, three were good, three doubtful or in poor condition, two were polluted and one contained an excess of lead.

Chemical Examination of Water from Bullet Pond, Rindge.

Number.	Date of collection	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
186	1901 Oct. 1	None	S. veg.	Dec.veg.	0.12	2.80	1.30	.0016	.0166	.0000	.0000	.16	....	.....	..
232	Oct. 20	None	None	Veg.	0.12	.....	....	.0016	.0180	.0000	.0000	.09	....	....	..
340	1902 Jan. 5	None	None	Veg.	0.2	2.30	1.10	.0032	.0172	.0000	.0000	.08	.40	....	..
348	Jan. 5	None	None	Veg.	0.2	2.50	1.10	.0032	.0162	.0000	.0000	.09	.40	....	..
1373	1903 July 27	Slight	None	S. musty	0.1	5.10	1.90	.0016	.0058	.0000	.0000	.08	1.40	....	..
1686	Nov. 23	Slight	V. S. fine	V. dec. veg.	0.1	4.00	1.10	.0000	.0144	.0300	.0000	.15	1.20	....	..
1687	Nov. 23	Slight	V. S. fine	Dec.veg.	0.2	4.20	2.10	.0014	.0128	.0200	.0000	.15	1.15	....	..
1758	Dec. 22	Slight	V. slight	V. mark. veg.	0.1	4.20	2.40	.0006	.0062	.0000	.0000	.25	2.30	....	..
1759	Dec. 22	Slight	Slight	V. mark. veg.	0.1	3.90	2.10	.0000	.0074	.0000	.0000	.20	2.30	....	..
1955	1904 May 16	Consid.	Much fine	V. arom.	0.2	4.20	2.20	.0000	.0110	.0000	.0000	.18	2.00	....	..
2687	1905 Feb. 9	None	None	Slight	0.1	4.3	2.1	.0030	.0120	.0000	.0000	.17	0.7	....	..
3138	Sept. 5	None	None	Slight	0.1	3.7	2.1	.0010	.0136	.0100	.0000	.17	0.9	....	..
3463	1906 Jan. 22	None	None	Veg.	0.1	3.5	1.5	.0026	.0074	.0100	.0000	.22	0.7	....	..
3978	Sept. 17	None	V. slight	S. veg.	0.15	4.0	1.5	.0010	.0074	.0050	.0000	.17	0.7	..	..
3981	Sept. 17	None	V. slight	None	0.10	4.1	1.6	.0030	.0094	.0050	.0000	.15	1.1	....	*

* Gate house at pond.

JEFFERSON.—No public supply. The Waumbek Hotel Company have a fine supply system of their own from natural springs and spring brooks.

*Chemical Examination of Water Supply of the Waumbek Hotel Company.**

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates	Nitrites.				
184	1901 Sept. 30	None	None	None	0.0	3.80	1.80	.0016	.0042	.0480	.0000	.03	....	.....	..

* Sample from spring east of main hotel.

KEENE.—In 1870 the City of Keene installed a public water supply from two ponds, one 50 acres and the other 110 acres in area; Sylvan Lake having an average depth of 20 feet, and Echo Lake 12 feet. There are also several auxiliary supplies.

About forty miles of cast-iron and cement-lined distributing mains and galvanized iron service pipes constitute this system. Twenty-two hundred persons, 85 per cent. of the population, take from this service. There are no private wells in the area.

Chemical Examination of Water from Keene.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
27	1901 June 24	V. slight	Slight floc.	Dec. veg.	0.2	2.80	1.00	.0000	.0169	.0000	.0000	.18	....	....	*a*
455	1902 Mar. 27	Slight	Slight	Veg.	0.23	1.60	.70	.0010	.0122	.0150	.0000	.07	.70	....	*b*
456	Mar. 27	Slight	Slight	Veg.	0.23	2.00	1.00	.0020	.0076	.0000	.0000	.07	.70	....	*c*
457	Mar. 27	V. slight	Slight	Veg.	0.32	3.10	.80	.0000	.0052	.0000	.0000	.07	.60	....	*d*
458	Mar. 27	Marked	Slight	Veg.	0.12	2.10	.80	.0010	.0078	.0000	.0000	.11	.60	....	*e*
1172	1903 May 3	Slight	Floc. fine	Veg.	0.2	2.80	1.50	.0014	.0198	.0000	.0000	.15	0.90	....	*f*
1173	May 4	Slight	Fine floc.	Veg.	0.15	5.00	2.00	.0014	.0158	.0000	.0000	.15	0.90	....	..
1174	May 4	Slight	Fine floc.	Veg.	0.1	3.00	0.60	.0020	.0202	.0000	.0000	.17	0.60	....	*g*
1175	May 4	Slight	Much fine floc.	Veg.	0.15	4.90	1.60	.0000	.0060	.0000	.0000	.10	0.40	....	..
2725	1905 Feb. 27	None	V. slight	Veg.	0.1	4.5	2.6	.0000	.0000	.0100	.0000	.15	0.1	....	..
3150	Sept. 5	None	V. slight	Veg.	0.2	4.8	3.5	.0020	.0116	.0200	.0000	.20	0.4	....	*h*
3406	1906 Jan. 22	None	V. slight	Veg.	0.2	3.6	1.8	.0050	.0064	.0100	.0000	.07	0.7	....	*i*

a Sample from Goose Pond; *b* sample from stream proposed as an additional supply; *c* sample from small stream flowing through an alder swamp; *d* small stream, part of proposed supply; *e* sample from Woodward Pond; *f* sample from intercepting reservoir; *g* sample from Sylvan Lake; *h* sample from Echo Lake; *i* sample from Roaring Brook.

Five samples representing private supplies were received, all of which were of good quality, though one contained much lead.

KENSINGTON.—No public supply.

KINGSTON.—No public supply. The village of Kingston Plains has dug wells, average depth 15 to 20 feet; light loam soil, sand sub-soil.

LACONIA.—The Laconia Water Company was incorporated in 1885. The supply is from Lake Paugus (Long Bay), a branch of Lake Winnepesaukee. This bay receives the sewage from The Weirs and from numerous cottages along its shores. The reservoir, 135x90 feet, and 18 feet deep, has a capacity of 2,700,000 gallons. There is about 28 miles of cement and cast-iron mains, while the service pipes are wrought iron, cement-lined. About 90 per cent. of the population are supplied from this source. Very few wells.

Chemical Examination of Water Supply of Laconia and Lakeport.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
532	1902 May 19	None	V. slight	S. veg.	0.1	2.80	.90	.0000	.0014	.0000	.0000	.13	.60	...	....
822	Sept.22	None	None	V. slight	0.1	4.00	1.10	.0000	.0062	.0000	.0000	.11	.60	...	....
2141	1904 July 11	None	None	None	0.4	7.70	4.90	.0022	.0098	.0450	.0008	.20	2.20	...	....
2732	1905 Mar. 1	None	V. slight	None	0.00	3.3	1.3	.0014	.0020	.0000	.0000	.15	0.6	....	*
3145	Sept. 6	V. slight	V. slight	Veg.	0.10	3.2	1.5	.0010	.0080	.0250	.0000	.12	0.9	....	....
3408	1906 Jan. 22	None	None	None	0.07	2.0	1.5	.0010	.0048	.0100	.0000	.17	0.7	....	....
3738	July 10	None	None	S. earthy	0.10	3.1	1.0	.0020	.0084	.0250	.0000	.05	1.0	....	†
3782	July 23	.....	.....	.....	....	....	.....	.....	.....	.....	.....	....	....	....	† *a*
3783	July 23	.....	.....	.....	....	....	.....	.....	.....	.....	.....	....	....	....	† *b*
3784	July 23	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	....	....	* *c*
3785	July 23	.....	.....	.....	....	....	.....	.....	.....	.....	.....	....	....	....	† *d*
3786	July 23	.....	.....	.....	....	....	.....	.....	.....	.....	.....	....	....	....	*n e*
3787	July 23	.....	.....	.....	....	....	.....	.....	.....	.....	.....	....	....	....	*n f*

* B. Coli present; † B. Coli in check sample; *a* intake Lake Paugus; *b* one mile above intake; *c* midway Big Island to Weirs Channel; *d* near Endicott Rock; *e* midway Weirs to Eagle Island; *f* one mile beyond Eagle Island; *n* no B. Coli.

In 1903 a water supply was introduced at the State School for Feeble-Minded, the source being Opeechee Lake. Several analyses were made of this water, both before and after the instalation of the supply.

Ten private supplies were examined, four of which were found to be in good condition, two of doubtful quality, three polluted, and one contained much lead.

Chemical Examination of Water from Opeechee Lake, Water Supply for the State School School for the Feeble-Minded.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1221	1903 June 10	None	Slight fine	V. slight	0.05	3.90	0.60	.0000	.0080	.0000	.0000	.15	1.50	....	..
1222	June 10	None	Slight fine	V. slight	0.05	6.20	1.60	.0000	.0074	.0000	.0000	.15	1.50	....	..
2000	1904 May 31	Slight	Slight fine	S. foul	0.05	3.40	1.40	.0000	.0084	.0050	.0000	.15	1.10	....	..
3173	1905 Sept. 17	V. slight	None	None	0.0	3.7	1.5	.0028	.0130	.0050	.0000	.15	0.7	....	..
3474	1906 Feb. 21	None	V. slight	None	0.0	2.7	1 5	.0030	.0080	.0050	.0000	.20	1.2	....	..

Lancaster.—The Lancaster Water Company's works were installed in 1891, and transferred to the precinct in 1894. The source of the supply is a mountain stream at a sufficient elevation to furnish pressure by gravity, and its reservoir has a capacity of 2,000,000 gallons. The distribution is through some 12 miles of iron mains, 12-inch to 6-inch. The service pipes also are of iron. Four hundred and sixty families, 98 per cent. of the population, are supplied.

Chemical Examination from Faucet of Precinct Water Works.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
813	1902 Sept. 19	None	None	V. slight	0.1	3.40	1.50	.0000	.0012	.0200	.0000	.05	1.50	....	..
1408	1903 Aug. 4	None	None	None	0.1	4.80	1.60	.0000	.0034	.1100	.0000	.10	1.60	....	..
1965	1904 May 17	Slight	Con. fine	S. veg.	0.25	3.60	1.90	.0000	.0150	.0450	.0000	.05	1.40	....	..
2686	1905 Feb. 8	None	None	None	0.05	5.0	2.2	.0000	.0000	.0300	.0000	.05	1.2	....	..
3187	Sept. 20	None	None	Slight	0.20	4.7	1.7	.0020	.0074	.0100	.0000	.05	1.1	....	..
3409	1906 Jan. 23	None	None	None	0.10	3.5	2.5	.0010	.0034	.0200	.0000	.04	0.7	....	..

LANDAFF.—No public supply.

LANGDON.—No public supply.

LEBANON.—The water supply is owned by the Fire Precinct, and was installed in 1897. At first the water was taken directly from a stream flowing from Mascoma Lake, but at present from wells, 63 x 30 x 15 feet, supplied by 900 feet loose-jointed pipe, fed by filtered water from the river. "Mascoma Lake receives water from Mascoma River, on which are sawmills and factories. At the head of the lake a small stream enters which receives sewage along its course. The lake also receives sewage from the Shaker buildings and from the village of Enfield." (See special report elsewhere on the Lebanon supply.)

Ten private supplies were examined, of which number, three were found of good quality, two doubtful or in poor condition, and five were polluted.

Chemical Analysis of Water Supplied West Lebanon by Hartford Water Company, White River Junction, Vt.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.			
3804	1906 July 31	None	None	S. veg.	0.1	7.0	4.0	.0018	.0080	.0500	.0000	.15	....	....

Chemical Examination of Water from the Lebanon Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
33	1901 June 27	None	S. floc.	S. veg.	0.3	4.60	2.80	.0000	.0115	.0000	.0000	.22	...	..	....
34	June 27	None	Min. matter	V. slight	0.0	7.60	5.30	.0000	.0000	.0100	.0000	.31	....	..	....
53	July 6	Marked	Much min.	None	0.0	6.70	4.10	.0073	.0098	.0000	.0000	.33	....	..	....
54	July 6	None	Min.	None	0.0	6.00	3.40	.0028	.0100	.0900	.....	3.51	....	..	....
614	1902 June 25	Slight	V. slight	Arom. veg.	0.2	7.00	2.60	.0006	.0082	.0330	.0000	.12	1.80	..	....
1144	1903 Apr. 19	None	None	Dec.veg.	0.0	5.00	3.60	.0000	.0190	.0000	.0000	.12	1.60	..	*a*
1297	July 6	Slight	Floc.	None	0.15	5.10	2.70	.0000	.0072	.0000	.0000	.10	2.00	..	*b*
1298	July 6	Slight	Floc. veg.	S. veg.	0.32	5.30	1.70	.0000	.0080	.0000	.0000	.06	1.50	..	*c*
1968	1904 May 18	None	None	V. slight	0.1	4.60	2.80	.0000	.0044	.0000	.0000	.10	2.30	..	....
2251	Aug. 8	Slight	Much floc. red	S. veg.	0.5	5.80	2.70	.0014	.0024	.0000	.0000	.30	2.40	..	*
2293	Aug. 22	None	V. slight	V. slight	0.05	4.00	2.00	.0000	.0020	.0000	.0000	.10	1.80	..	*
2294	Aug. 22	None	None	V. slight	0.05	3.90	1.90	.0000	.0070	.0000	.0000	.10	1.60	..	*
2391	Oct. 3	None	None	None	0.15	4.4	1.7	.0000	.0022	.0000	.0000	.12	2.3	..	*
2397	Oct. 3	None	None	S. earthy	0.00	5.0	1.8	.0096	.0020	.0000	.0001	.10	2.0	..	**a*
2665	1905 Jan. 29	V. slight	S. fine	S. musty	0.00	19.5	15.6	.0014	.0000	.0000	.0001	2.0	7.4	..	*d*
2684	Feb. 6	Slight	M. fine	Peculiar	0.05	17.6	15.6	.0020	.0000	.0000	.0004	2.0	7.0	..	*d*
2949	July 3	None	S. floc.	S. earthy	0.17	5.4	2.9	.0000	.0014	.0000	.0000	.15	1.6	..	*
3140	Sept. 5	None	None	None	0.10	6.7	4.8	.0006	.0060	.0200	.0000	.27	2.7	..	....
3298	Nov. 16	None	None	S. earthy	0.20	5.2	3.0	.0010	.0053	.0100	.0000	.25	2.4	..	....
3426	1906 Jan. 31	None	None	None	0.10	5.9	3.4	.0006	.0024	.0050	.0000	.22	2.2	..	....
3792	July 29	None	None	None	0.00	6.3	4.8	.0014	.0044	.0050	.0000	.25	2.2	..	....
3870	Aug. 20	None	None	S. veg.	0.10	7.1	6.1	.0010	.0024	.0000	.0000	.27	3.5	..	*
3948	Sept. 7	None	S. floc.	None	0.15	5.2	2.8	.0036	.0050	.0030	.0000	.05	1.4	..	**e*
3951	Sept. 7	S. opal.	Slight	Earthy	0.40	5.4	2.4	.0036	.0100	.0030	.0000	.05	1.4	..	**f*
3964	Sept. 8	.....	....	.....	....	.....	....	.....	.....	.....	.....	....	....	..	*nd*
3965	Sept. 8	.....	.....	.....	....	.....	....	.....	.....	.....	.....	....	....	..	**g*

a Tap from Mascoma River filtered through Duplex filter; *b* from storage well; *c* from Mascoma River; * B. coli present; *d* new artesian well; *e* from filter well; *f* gallery; *n* B. coli absent; *g* tap at pumping station.

LEE.—No public supply.

LEMPSTER.—No public water supply.

LINCOLN.—The J. E. Henry & Sons Co. introduced a water supply in 1903 directly from a stream. The watershed has an area of several hundred acres, wooded land. It is a gravity system, employing about one half a mile of plain iron main, and also iron service pipes. The entire village is served from this supply. There are no private wells within the area.

Chemical Examination of Water from Faucet of Supply of J. H. Henry & Sons.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
762	1902 Sept. 1	None	V. slight	V.S.veg.	0.1	4.80	1.90	.0000	.0044	.0150	.0000	.05	.30	....	..
1377	1903 July 25	None	None	V. slight	0.05	4.10	1.30	.0000	.0030	.0000	.0000	.04	0.60	....	..
1956	1904 May 14	None	Slight	None	0.2	2.90	1.30	.0000	.0054	.0000	.0000	.05	0.90	....	..
3171	1905 Sept. 14	None	None	None	0.15	3.5	2.0	.0010	.0080	.0100	.0000	.10	0.6	....	..
3426	1906 Jan. 30	None	None	None	0.10	2.5	1.4	.0010	.0034	.0050	.0000	.05	0.4	....	..

LISBON.—The Lisbon Water Works, owned by a private company and installed in 1887, is supplied from a pond fed by springs. The area of the pond is 100 acres; the bottom is gravelly. This is a gravity system, the reservoir having a capacity of 1,000,000 gallons. The mains are of wrought iron, six miles, and the service pipes are the same. About three hundred families, 90 per cent. of the population, are takers. Very few private wells. (See special report.)

One private supply examined was found to be of good quality. Two samples of ice were also received from this town, both being found of good quality.

Chemical Examination of Water from the Reservoir of the Lisbon Water Works Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
796	1902 Sept. 9	Slight	Consid. floc.	V. slight	0.0	6.90	2.60	.0000	.0066	.0000	.0000	.08	2.30	....	..
1387	1903 Sept. 29	Slight	None	Dec. vg.	0.1	6.70	2.80	.0000	.0120	.0000	.0000	.05	2.70	....	..
1985	1904 May 24	Slight	S. fine	S. musty	0.25	6.10	2.70	.0000	.0090	.0000	.0000	.05	1.90	....	..
2707	1905 Feb. 20	None	Slight	S. veg.	0.10	6.2	4.2	.0000	.0060	.0800	.0000	.15	2.2	....	..
3165	Sept 14	None	S. fine	Earthy	0.30	5.7	2.6	.0000	.0116	.0100	.0000	.07	2.2	....	*
3442	1906 Feb. 4	None	S. ferrug.	None	0.20	5.2	3.5	.0014	.0058	.0100	.0000	.10	2.1	....	..

* B. coli present.

LITCHFIELD.—The water supply is from springs and is brought to the houses through lead pipes. There are very few wells in town.

LITTLETON.—The town of Littleton some time ago abandoned the use of Ammonoosuc River as a water supply, and has gone some 10½ miles from the village to a new supply, the north branch of Gale River, the intake of which is at the base of Mt. Garfield. The main pipe, 19 miles long, is 16 inches in diameter for a short distance from the intake; 12 inches for the next five miles; and 10 inches for the remainder of the distance. There are two reservoirs, of 1,000,000 and 500,000 gallons' capacity.

Nine private supplies examined, two of which were good, one of doubtful quality, six polluted and one contained much lead.

Chemical Analysis of Water from New Supply, Littleton.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1148	1903 Apr. 17	None	S. floc. vg.	None	0.2	2.90	1.00	.0000	.0026	.0200	.0000	.07	0.90	....	*a*
1149	Apr. 17	None	S. floc. vg.	None	0.15	2.00	0.90	.0000	.0016	.0200	.0000	.05	0.90	....	*b*
1706	Dec. 2	None	None	None	0.05	3.30	2.10	.0006	.0012	.0400	.0000	.07	0.50	....	..
1707	Dec. 1	None	None	None	0.05	3.10	2.00	.0020	.0012	.0400	.0000	.07	0.50	....	..
1779	1904 Jan. 1	None	V. slight	V. S. vg.	0.05	4.00	2.60	.0000	.0010	.0400	.0000	.15	0.90	....	..
2755	1905 Mar. 16	None	None	None	0.0	5.1	2.5	.0000	.0000	.0300	.0000	.07	0.4	....	..
3423	1906 Jan. 30	None	None	.....	0.0	16.5	8.5	.0024	.0024	.0120	.0000	1.3	5.1	....	*c*

a South branch of Gale River.
b North branch of Gale River.
c Spring in village.

Livermore.—The Livermore Mills Company inaugurated a water supply some twenty years ago, the source being both springs, pond and streams. The watershed is about thirty thousand acres in area, and there are 150 persons living thereon. The soil is clay and gravel. The system is a combination gravity and pump, the latter 150 H. P. Iron pipe is used for the mains.

Londonderry.—No public supply. Two private supplies were examined, one of these being found in good condition, the other classed as doubtful.

Loudon.—No public supply. Both of the private supplies examined were found to be polluted.

Lyme.—In 1838 the Lyme Aqueduct Company inaugurated a system of water works, the source being springs.

Of the four private supplies examined, two were found good, one of doubtful quality, and one was polluted.

Chemical Examination of Water from Supply of Lyme Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
772	1902 Sept. 3	None	V. slight	None	0.0	8.40	4.70	.0000	.0018	.0250	.0000	.08	4.70	.....	..
1723	1903 Dec. 10	Slight	S. fine	None	0.0	5.40	3.60	.0000	.0022	.0150	.0000	.07	3.10	.0280	..
1975	1904 May 28	None	V. slight	S. foul	0.0	5.50	4.60	.0020	.0020	.0000	.0000	.12	4.50	.....	..
3160	1905 Sept. 12	None	None	S. foul	0.1	7.5	5.3	.0014	.0024	.0100	.0000	.07	4.1	.025	..
3431	1906 Feb. 1	None	V. slight	None	0.0	7.8	5.7	.0020	.0040	.0100	.000	.15	3.9	.....	..

Lyndeborough.—No public supply. The single sample forwarded from this town was found to represent a polluted water.

Madbury.—No public supply.

Madison.—The John F. Chick private water supply was installed in 1905. The source is a spring, excavated two or three feet deep, and the water flows by gravity through about one mile of galvanized iron pipe, both main and service. About fifteen families take this water. There are some private wells within the area. The single private supply examined was found of good quality.

Manchester.—A water supply was instituted by the city in 1873, was added to in 1886, and supplemented by a high service in 1894. The source is Lake Massabesic, having an area of 2,500 acres, an average depth of 20 feet, and a bottom partly rocky and partly muddy. It has approximately 40 miles of watershed, wooded and cleared about equally. Some sawdust enters the lake. The water is pumped to a reservoir of 15,000,000 gallons' capacity, and an average depth of 20 feet. Low service by gravity; high service by steam; 4,000,000-gallon reservoir. There are 110 miles of distributing mains, iron; service pipes are iron, lead lined. The average daily consumption is 3,500,000 gallons; 13,000 families, 99 per cent. of the population, are consumers of this water. There are not many individual wells within the radius of this supply.

Chemical Examination of Water from Lake Massabesic.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
369	1902 Jan. 21	None	None	Dec. vg.	0.8	5.70	1.20	.0054	.0204	.0000	.0000	.12	.70	....	*
370	Jan. 21	None	None	Dec. vg.	0.7	5.50	.70	.0044	.0228	.0000	.0000	.16	.70	....	†
371	Jan. 21	None	None	Dec. vg.	0.7	5.70	1.00	.0020	.0188	.0000	.0000	.21	.70	....	‡
372	Jan. 21	None	None	Dec. vg.	1.0	9.10	1.60	.0012	.0156	.0000	.0000	.17	.70	....	..
727	Aug. 22	None	Floc. veg.	Veg.	0.35	7.40	1.30	.0000	.0106	.0000	.0000	.17	1.20	....	¶
1074	1903 Mar. 5	Slight	Fine floc. veg.	Dec. vg.	0.1	3.80	1.00	.0010	.0132	.0040	.0000	.10	0.0	....	‡
1075	Mar. 5	Slight	Fine floc. veg.	Dec. vg.	0.7	4.90	1.10	.0000	.0066	.0040	.0000	.11	1.00	....	§
1076	Mar. 5	Slight	Fine floc. veg.	V. dec. veg.	0.75	6.50	1.30	.0000	.0066	.0040	.0000	.15	1.20	....	†
1077	Mar. 5	Slight	Fine floc. veg.	Dec. vg.	0.65	4.80	1.60	.0000	.0066	.0040	.0000	.17	1.40	....	††
2491	1904 Oct. 26	Slight	M. fine	Dec. vg.	0.4	3.5	1.7	.0000	.0060	.0050	.0000	.22	0.4	....	*a*
2492	Oct. 26	Slight	M. fine	S. veg.	0.25	3.7	2.3	.0000	.0072	.0050	.0000	.15	0.4	....	**
2493	Oct. 28	Slight	S. fine	Dec. vg.	0.30	3.7	2.7	.0000	.0060	.0050	.0000	.17	0.4	....	†
2494	Oct. 28	V. slight	M. fine	S. veg.	0.35	4.0	1.9	.0000	.0060	.0050	.0000	.15	0.4	....	§
2495	Oct. 28	Slight	M. fine	S. veg.	0.30	3.1	2.0	.0000	.0060	.0050	.0000	.15	0.4	....	*b*
3177	1905 Sept. 19	None	None	Arom.	0.20	4.5	1.7	.0006	.0104	.0100	.0000	.20	0.6	....	**
3214	Oct. 4	None	S. fine	Veg.	0.40	3.7	0.8	.0008	.0100	.0050	.0000	.27	0.6	....	*c*
3215	Oct. 4	S. fine	S. fine	S. veg.	0.20	4.5	1.8	.0008	.0092	.0050	.0000	.27	0.7	....	*d*
3216	Oct. 4	S. fine	S. fine	Veg.	0.30	5.4	2.4	.0008	.0100	.0050	.0000	.30	0.6	....	†
3217	Oct. 4	None	S. fine	S. veg.	0.20	5.2	2.5	.0008	.0106	.0050	.0000	.30	0.7	...	**
3218	Oct. 4	Slight	Slight	Veg.	0.20	4.0	1.9	.0008	.0084	.0050	.0000	.25	0.7	....	*e*
3219	Oct. 4	None	Slight	Veg.	0.55	6.9	2.2	.0030	.0084	.0050	.0000	.22	1.1	....	§

* Sample taken at high service intake.
† Sample taken at Deer Neck Bridge, Auburn.
‡ Sample taken halfway between Severance Beach and Battery Point.
§ Sample taken at mouth of Sucker Brook.
¶ Sample taken at tap in Board of Health Building from low service reservoir.
†† Sample taken in front of Judge Emery's house in Auburn.
a Taken between Battery and Rocky points.
b Island toward low service intake.
** B. coli present.
c Battery Point.
d Bog, north end of Back Pond.
e Dam at outlet.

Chemical Analysis of Water from Various Supplies of State Industrial School, Manchester.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
498	1902 May 5	None	None	None	0.0	9.70	5.60	.0026	.0034	.0800	.0000	.40	2.00	....	*
499	May 5	Slight	None	S. veg.	0.0	7.60	4.50	.0000	.0026	.2500	.0000	.70	1.95	....	†
500	May 5	Marked	None	Marked stable	0.3	7.80	2.10	.0036	.0148	.0700	.0000	.40	1.60	...	‡
1909	1904 April 27	None	Slight	V. slight	0.05	7.10	5.60	.0052	.0096	.0800	.0003	.80	1.10	.. .	§
1910	April 27	None	None	Slight	0.0	6.90	3.90	.0040	.0042	.1000	.0002	.60	3.20	....	§§
1911	April 27	None	None	Slight	0.05	5.10	2.50	.0000	.0052	.0050	.0000	.25	2.20	....	††
1912	April 27	None	Slight	Slight	0.0	9.30	6.60	.0014	.0026	.4000	.0003	.70	3.10	....	**
1913	April 27	None	Slight	Slight	0.0	6.10	2.90	.0026	.0032	.0500	.0004	.35	2.40	....	¶

* Bricked up spring west of pond.
† Tank in top of main building fed by spring well near Union Street.
‡ Pond north of horse barn, while pond was turbid after heavy rains.
§ South horse spring.
§§ North cow spring.
†† Big north well.
** Big south well.
¶ Spring near red barn; B. coli present.

Twenty-six private supplies were investigated. Of these, seven were found to represent good water, five were of doubtful quality or in poor condition, thirteen were polluted, and one showed an excess of lead.

Marlborough.—Water is from private springs, average about three feet deep, and flows by gravity through one-inch lead pipe to dwellings.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2407	1904 Oct. 3	Slight	Con. floc.	Musty	0.05	10.6	3.1	.0000	.0000	.0000	.0000	.15	0.3	.....	..
2408	Oct. 3	None	M. fine	Musty	0.10	15.7	8.1	.0000	.0000	.0000	.0000	.15	0.4	.....	..
2669	1905 Jan. 30	None	Much	None	0.0	4.1	2.1	.0000	.0000	.0100	.0000	.15	0.4	0.056	..
3647	1906 May 29	None	None	Slight	0.10	2.0	1.0	.0020	.0024	.0100	.0000	.07	.. .	.....	..

Of the nine private supplies examined, three were good waters, one was of doubtful quality, four were found to be polluted, and one contained much lead.

MARLOW.—All use wells or spring water. Of the four supplies investigated two were found of good quality and two were polluted.

MASON.—No public supply. Three private supplies were examined, two of which were of doubtful quality and one was unfit for use.

MEREDITH.—The Meredith Fire District owns and operates a water supply that was installed in 1894, the source being springs. The water flows by gravity from a reservoir on a hill, 175 feet above the level of the town. The iron main is 4¾ miles long; the service pipes are of galvanized iron. Two hundred families, 85 per cent. of the population, are supplied. There are two public drinking fountains on this system.

Chemical Examination of Water from a Faucet of the Supply of the Meredith Fire District.

Number.	Date of collection.	Appearance			Color.	Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.		Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
774	1902 Sept. 3	None	None	Dec.veg.	0.2	6.10	1.60	.0020	.0074	.0000	.0000	.12	1.60	.....	..
1296	1903 July 7	Slight	V. slight	M. veg.	0.1	5.00	2.80	.0000	.0038	.0000	.0000	.10	1.60	.....	..
1399	Aug. 3	Marked	M. fine	V. dec. veg.	0.25	6.60	1.90	.0040	.0158	.0300	.0000	.15	1.90	.....	..
1971	1904 May 23	None	None	S. veg.	0.25	3.10	1.70	.0022	.0030	.0000	.0000	.15	1.60	.....	..
2688	1905 Feb. 9	None	None	V. slight	0.10	6.0	3.3	.0010	.0000	.0100	.0000	.20	1.8	.....	..
3193	Sept. 25	V. slight	None	Slight	0.20	4.2	2.6	.0010	.0082	.0100	.0000	.10	1.5	.....	..
3427	1906 Jan. 30	None	None	Slight	0.10	4.9	2.6	.0008	.0024	.0050	.0000	.22	1.2	trace	..

Of the six private supplies examined three were of good quality, the balance being polluted.

MERRIMACK.—No public supply. One private supply examined was found of good quality; three others were reported as being unfit for use.

MIDDLETON.—No public supply. This is strictly a farming town and each place has its individual well.

MILAN.—No public supply. Of the three private supplies investigated two were classed as doubtful and the third contained much lead.

MILFORD.—The public water works of Milford were built in 1890 by John T. Langford and purchased by the town in 1891. There are three collecting wells, two of them about 35 feet in diameter and one 20 feet deep; one somewhat smaller is fed by driven pipes. Soil, gravel with clay bottom. The water is pumped to a stand pipe of 250,000 gallons' capacity.

Chemical Examination of Water from Faucet of Milford Water Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1901														
152	Sept. 9	None	None	None	0.2	5.10	3.20	.0012	.0074	.0120	.0000	.23	....	....	..
	1902														
826	Sept. 22	None	None	None	0.1	6.40	3.60	.0000	.0030	.0000	.0000	.13	3.40	....	..
827	Sept. 22	V. slight	Slight	Slight	0.3	8.00	2.60	.0022	.0066	.0000	.0003	.18	2.60	....	..
	1903														
1014	Jan. 28	Slight	None	Veg.	0.1	13.60	4.00	.0000	.0008	.0000	.0000	.17	3.30	....	..
1400	Aug. 3	V. slight	None	None	0.1	5.60	2.80	.0000	.0040	.0000	.0000	.15	2.40	....	..
	1904														
1980	May 23	None	None	S. earthy	0.15	5.90	1.40	.0000	.0018	.0000	.0000	.10	1.20	....	*
2080	June 21	Slight	V. marked floc. red	V. slight	0.3	6.60	4.60	.0006	.0010	.0000	.0000	.22	4.70	....	..
2147	July 12	None	V. slight	V. slight	0.3	4.40	1.10	.0026	.0044	.0000	.0000	.20	.90	....	*a*
2148	July 12	Marked	V. slight	None	0.1	6.60	2.20	.0014	.0034	.0000	.0000	.17	2.30	....	*b*
2206	July 26	V. slight	V. slight	V. slight	0.3	3.70	2.40	.0000	.0060	.0000	.0000	.12	1.80	....	*c*
2208	July 26	None	None	None	0.0	4.90	3.50	.0006	.0000	.0200	.0000	.17	1.10	....	*a*
2368	Sept. 14	Slight	Slight	V. slight	.15	4.90	2.90	.0000	.0064	.0000	.0000	.20	1.90	....	*d*
2369	Sept. 14	Slight	Slight	None	0.3	6.10	2.50	.0000	.0070	.0000	.0000	.15	2.70	....	*c*
2370	Sept. 15	None	Con. floc.	Dec. earthy	0.05	5.20	2.40	.0010	.0024	.0000	.0000	.20	2 60	....	*b*
	1905														
3163	Sept. 13	V. slight	Slight	None	0.30	7.3	4.4	.0000	.0104	.0100	.0000	.17	2.9	....	*c*
3164	Sept. 13	V. slight	None	None	0.20	5.5	2.8	.0006	.0054	.0050	.0000	.20	2.3	....	..
	1906														
3419	Jan. 30	None	Slight	None	0.10	4.4	3.5	.0008	.0020	.0050	.0000	.20	2.2	....	*e*
3759	July 17	None	None	None	0.15	5.8	3.3	.0006	.0020	.0100	.0000	.20	1.6	....	..

* B. Coli present; *a* well No. 1; *b* well No. 2; *c* well No. 3; *d* standpipe; *e* tap at pumping station.

Twenty-nine private supplies were investigated. Of these six were of good quality, 11 were doubtful or in poor condition, 10 were polluted, and two contained an excess of lead.

MILTON.—This town (two villages) is dependent for its water supply upon private wells. The land is shallow with ledge but rarely more than a few feet from the surface. The twelve private supplies examined included three of good quality, two doubtful, and seven polluted.

MONROE.—People have their private water supplies, mostly from springs.

MONT VERNON.—No public supply. The eight private supplies investigated included four of good quality, one doubtful, two polluted, and one containing an excess of lead.

MOULTONBOROUGH.—No public supply.

NASHUA.—A private supply, the Pennichuck Water Works, installed by Nashua Aqueduct Company, in 1853, has for a source springs and wells. The wells, from 16 to 52 feet in depth, are driven through alternate layers of marl, sand, fine gravel and coarse gravel, and flow from 20 gallons to 275 gallons per minute. The reservoir, of 4,000,000 gallons' capacity, is 13 feet in depth. There are about 75 miles of cast-iron distributing mains; wrought iron, galvanized, is used for service pipes. The average daily consumption is 3,500,000 gallons, by 4,000 families, about 95 per cent. of the population. There are not over five or six wells.

One private supply was examined and found good.

Chemical Examination of Water from Tap of Pennichuck Water Works Company, Nashua.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1902														
750	Aug. 26	None	None	S. veg.	0.0	6.00	1.50	.0000	.0000	.0000	.0000	.15	1.50	....	..
1136	Apr. 12	None	Floc. veg.	S. veg.	0.0	4.00	2.70	.0000	.0010	.0150	.0000	.17	2.00	....	..
1137	Apr. 12	None	None	None	0.0	3.80	2.20	.0000	.0000	.0000	.0000	.15	2.40	....	..
1395	July 3	Slight	Floc. veg.	V. dec. veg.	0.08	4.30	2.30	.0000	.0048	.0000	.0000	.20	2.20	....	..
1396	July 3	Slight	Floc. veg.	V. dec. veg.	0.08	5.20	2.50	.0000	.0024	.0000	.0000	.20	2.20	....	..
	1904														
1978	May 23	V. mark.	S. fine	S. musty	0.6	4.10	1.10	.0000	.0024	.0350	.0000	.22	.90	....	..
2384	Sept. 19	Slight	Con. fine	V. dec. veg.	0.2	4.40	2.70	.0000	.0024	.0000	.0000	.20	1.40	....	..
2500	Oct. 31	None	S. fine	V. slight	0.0	5.7	4.0	.0000	.0020	.0000	.0000	.20	2.6	....	..
	1905														
2682	Feb. 6	None	None	Earthy	0.1	4.2	1.9	.0000	.0000	.0100	.0000	.17	1.8	....	..
3180	Sept. 19	Slight	None	Veg.	0.15	6.3	2.8	.0034	.0082	.0050	.0000	.17	1.9	....	..
	1906														
3445	Feb. 6	None	None	Veg.	0.10	3.7	2.7	.0008	.0030	.0050	.0000	.22	2.0	....	..
3820	Aug. 7	V. slight	V. slight	Veg.	0.03	6.0	5.0	.0010	.0064	.0050	.0000	.20	1.4	....	..

NELSON.—No public supply. The single private supply examined was found of good quality.

NEW BOSTON.—The New Boston Creamery furnishes water from a pond, known as Grist Mill Pond, in river; it is of small area and hard bottom. The water flows by gravity through eight-inch pipe from pond forced through pump, eight-foot head. This water is furnished for fire hydrants, and to eight families, but is not used for drinking or in food. Drinking water is from wells and springs. Of the two samples received from this town, one was found polluted and the second contained too much lead for safety.

NEWBURY.—Private parties supply running water from springs to the summer cottages at Blodgett's Landing. Another party supplies his own and two or three other cottages from a well. Both of the two private supplies submitted to investigation were found of good quality, though one contained too much lead for safety.

NEWCASTLE.—The water supply is from wells and cisterns. The Portsmouth Water Works runs water to the forts, and two or three summer cottages are connected with it. Of the four private supplies examined, one was found in good condition, two were classed as doubtful, and the fourth showed much pollution.

NEW DURHAM.—The water supply is from springs or wells, mostly from dug wells, but some are bored. There are some private wells by the roadside, and facilities for drinking are furnished to man and beast. Two private supplies were submitted to investigation, one being found of good quality, the other unfit for use.

NEWFIELDS.—No public supply. Of the two private supplies examined one was of good quality, the other being classed as doubtful.

NEW HAMPTON.—The farm houses are partly supplied with water by pumping directly from wells; most of the others from springs and wells through lead pipe. The wells are excavated from six to ten feet, and furnish water through ½-inch lead pipe to one, two or three dwellings. One private supply was found to be polluted and one contained too much lead for safety.

NEWINGTON.—There is no public water supply. Each family has its private well.

NEW IPSWICH.—There is one spring in town, or it might be termed a well, from which three families get water through a ¾-inch lead pipe. The well is in a pasture, 60 rods from the buildings, and is dug about seven feet deep.

One fountain at the center of the town, for both man and beast, is supplied by a well about six or eight feet deep and about thirty rods distant, the water flowing through a lead pipe.

Ten private supplies were examined. Of this number, two were found good, three were of doubtful quality or in poor condition, three were polluted and two contained much lead.

NEW LONDON.—A few families are furnished water from a private supply installed in 1904, the source being a well bored to a depth of 200 feet in clay soil. Recently the matter of a public supply system has received some consideration, and in this connection preliminary analyses have been made of the water of Morgan Pond, located in the town of Springfield.

Chemical Examination of Water from Morgan Pond.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3931	1906 Aug. 28	None	S. veg.	S. veg.	0.50	5.0	2.2	.0026	.0134	.0000	.0000	.05	0.7	..	....
3932	Aug. 28	None	S. veg.	S. veg.	0.60	6.0	2.8	.0390	.0170	.0000	.0000	.10	0.9	..	*a

* B. coli present. a Brook flowing from Morgan Pond.

Of the 12 private supplies investigated, four were classed as excellent, seven as polluted and one as unfit for use by reason of an excessive lead content.

NEWMARKET.—The public water supply, owned by the town, was built in 1894. The water, from springs, is pumped to a standpipe of 22,000 gallons' capacity. There are seven miles of cast-iron distributing mains, and the service pipes are of galvanized iron. The average daily consumption is 150,000 gallons. About 90 per cent. of the population are supplied from this system, but some private wells are still in use. The two well supplies examined were badly polluted. One spring water was of good quality.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2952	1905 July 3	None	Clayey	Earthy	0.35	7.1	5.8	.0000	.0042	.0000	.0000	.30	2.8	....	*
3444	1906 Feb. 6	S. opal.	None	None	0.10	7.7	5.2	.0006	.0028	.0100	.0000	.35	1.9	....	..

* B. coli present.

Both of the private supplies examined were reported as being polluted.

NEWPORT.—The town owns and operates a system of water works, installed in 1894, supplied by a pond, or lake, of 66 acres; average depth about thirty feet; bottom largely sand and rock. The watershed is about

four or five square miles, about two thirds wooded; three families reside thereon. There are also one or two individuals who sell spring water.

The public supply is a gravity system, with eight miles of cast-iron mains, and wrought-iron, cement-lined service pipes. Perhaps five hundred families take this water. There are not many private wells.

Chemical Examination of Water from Tap of Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
844	1902 Oct. 9	None	None	Veg.	0.1	6.90	1.20	.0000	.0048	.0000	.0004	.10	.90	....	..
2013	1904 June 2	None	None	S. musty	0.1	4.10	2.50	.0000	.0036	.0000	.0000	.15	1.60	....	..
3448	1906 Feb. 6	V. slight	V. slight	S. veg.	0.1	2.8	1.4	.0026	.0070	.0050	.0000	.12	0.4	....	..

Ten private supplies were examined, of which number, four were found of good quality, three were polluted and three were unfit for use because of much lead.

Newton.—All the water used in this town is from private wells, and many of them are dry during a time of drought. Three examinations of these well-waters showed two of this number to be polluted.

Northfield.—The Tilton & Northfield Aqueduct Company's works were built in 1887–'88. The source is Chestnut Pond, of 60 acres area, 10 to 76 feet deep, sandy or gravelly bottom. Several hundred acres of the watershed are pasture and woodland; five farms. This is a gravity system, with 12 miles of cement-lined and cast-iron mains, with galvanized iron service pipes. Probably 500 families take this water, 80 or 90 per cent. of the population. Very few private wells.

Of the five private supplies examined two were found of good quality, one was classed as doubtful, and two contained much lead.

Chemical Examination of Water from a Faucet of the Tilton & Northfield Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
11	1901 May 28	V. slight	Slight	Distinct veg.	0.2	3.40	1.30	.0019	.0150	.0009	.0000	.09	....	....	..
345	Dec. 31	None	None	None	0.2	2.90	1.20	.0044	.0136	.0050	.0000	.09	0.90	....	..
1219	1903 June 1	Marked	Much flocculated	V. slight	0.2	4.60	2.00	.0000	.0100	.0000	.0000	.10	1.10	....	..
1431	Aug. 11	Slight	None	V. slight	0.15	3.00	1.00	.0000	.0074	.0000	.0000	.09	0.40	....	..
1636	Nov. 2	None	None	None	0.0	2.80	1.30	.0000	.0050	.0000	.0000	.20	1.20	....	..
2022	1904 June 7	Slight	Much fine	V. slight	0.3	4.40	2.20	.0000	.0098	.0000	.0000	.10	1.90	....	..
2712	1905 Feb. 21	Slight	V. slight	Slight	0.10	3.9	2.5	.0009	.0010	.0150	.0000	.15	0.6	....	..
2785	Apr. 3	None	None	Dec. veg.	0.30	8.5	6.5	.0000	.0044	.0100	.0000	.15	0.6	....	..
3482	1906 Feb. 22	V. slight	None	S. earthy	0.20	2.0	1.0	.0010	.0084	.0050	.0000	.17	0.9	..	..

NORTHUMBERLAND.—Groveton Village Precinct incorporated a system of public water works in 1894, from streams. There are two watersheds, of wooded land mainly, with no inhabitants. The source of the supply is in the mountain-side, and the water flows by gravity through about four miles of cast-iron mains; service pipes are of galvanized iron. The entire precinct is supplied from this system. There are two or three private wells within the radius of this supply.

Northumberland Falls is supplied by a private water company.

NORTHWOOD.—No public supply. Six private supplies examined included one of good quality, one classed as doubtful, and four polluted.

NOTTINGHAM.—All get water from wells and springs.

Chemical Examination of Water from Well Used by General Public.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3020	1905 July 26	None	V. slight	None	0.0	5.7	3.5	.0008	.0022	.0200	.0000	.27	1.4	....	..

Of the two private supplies examined one was found of doubtful quality and one polluted.

ORANGE.—The supply is wholly from private wells and springs. The single supply examined was found of good quality.

ORFORD.—No public supply. There are private supplies from springs, which furnish water to some 30 families. These springs are dug from six to eight feet deep, through sandy loam, subsoil rock. The water flows by gravity through iron and lead mains, with lead for service pipes. There are no individual wells in the vicinity. There are several other private springs.

Chemical Examination of Water from the Wilcox Springs.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
766	1902 Sept. 2	V. slight	Slight floc.	None	0.0	5.60	4.30	.0000	.0000	.0000	.0000	.05	3.20	....	..

OSSIPEE.—The entire supply is from wells and springs. Of the seven private supplies examined three were found of good quality, one was classed as doubtful, two were polluted, and one contained much lead.

PELHAM.—The water supply is wholly from private wells, varying in depth from 12 to 40 feet.

PEMBROKE.—There are two private supplies. The Suncook Water Works, built in 1896, is supplied from a pond having an area of 25 acres, 15 feet deep on an average, and a very muddy bottom. No inhabitants within two or three miles. The water flows by gravity. There are nine miles of distributing mains, cast iron; service pipes of galvanized iron. About 50 per cent. of the population are supplied from this source. The Baker & Dearborn Water Works were built in 1895, the source being a spring and Suncook River. The latter receives all the sewage of Pittsfield, 16 miles above. The river water is pumped to three reservoirs, 150 x 20, 50 x 20, and 50 x 20, and nine feet deep respectively. The distributing main is one mile in length and is of wrought iron; service pipes of galvanized iron. About 10 per cent. of the population take from this supply.

Chemical Examination of Water from Suncook Water Works.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1331	1903 July 14	None	Floc. veg.	S. veg.	1.5	6.10	0.90	.0028	.0248	.0000	.0000	.15	.60	....	..
1583	Oct. 12	None	None	S. veg.	0.7	5.90	1.00	.0000	.0126	.0000	.0000	.17	.60	....	..
1932	1904 May 8	None	None	Marked veg.	0.85	2.00	0.40	.0020	.0102	.0000	.0000	.12	.40	....	..
2658	1905 Jan. 23	None	None	Veg.	1.2	8.0	2.1	.0000	.0134	.0200	.0000	.20	1.9	....	..
2729	Feb. 27	None	None	Slight	0.7	5.8	2.6	.0014	.0046	.0000	.0000	.27	1.5	....	..
2961	July 6	None	Con. floc.	S. veg.	1.6	5.5	1.7	.0000	.0104	.0000	.0000	.12	1.2	....	..
3278	Oct. 31	None	None	Arom'tic	1.2	6.7	2.7	.0028	.0136	.0050	.0000	.22	1.5	....	..
3840	1906 Aug. 14	V. slight	Moderate	None	1.2	4.5	2.0	.0044	.0190	.0100	.0000	.07	....	....	*

Chemical Examination of Water from Baker and Dearborn Supply.

1584	1903 Oct. 12	Slight	V. slight	S. foul	0.2	3.60	1.90	.0020	.0026	.0000	.0000	.20	2.40	....	..
3269	1905 Oct. 30	None	Slight	None	0.3	4.6	2.6	.0010	.0050	.0100	.0000	.56	0.6	....	*
3319	Nov. 28	.....	.....	.....	....	.....	....	.....	.....	.....	.....	.50	....	....	*
3846	1906 Aug. 14	None	V. slight	None	0.1	4.4	3.4	.0014	.0062	.0100	.0000	.25	.22	....	..

* B. Coli present.

Of the fourteen private supplies examined six were found of good quality, seven were polluted, and one contained an excessive amount of lead.

Penacook (Ward 1, Concord).—The village of Penacook is supplied with water from two sources. That portion of the ward lying north of the Contoocook River is furnished from the Penacook and Boscawen water precinct system, the source being Walker Pond. For analysis and further description see Boscawen.

The remaining portion of the village is supplied with water from Penacook Lake by the Concord Water Works, the high pressure system of which was extended to Penacook in the summer of 1904. For further description see Concord.

Of the six private supplies examined, five were found to contain too much lead for safety.

PETERBOROUGH.—In 1896 the town installed a water supply from a brook fed by springs. The watershed is three miles by one mile in extent, consisting of pasturage and woodland. It is a gravity system of approximately ten miles of distributing mains, iron; service pipes of iron, cement lined. There are quite a number of wells still in use, but they are gradually being given up. An additional supply is being considered for the town, the source being Cunningham Pond.

Chemical Examination of Water from Tap of Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1902														
851	Oct. 10	None	None	Dec. vg.	0.4	6.30	1.80	.0000	.0062	.0000	.0000	.12	1.80	...	..
	1903														
1427	Aug. 10	None	V. slight	S. veg.	0.4	7.70	1.70	.0000	.0098	.0000	.0000	.10	1.60	....	..
1452	Aug. 17	None	V. slight	V. S. vg.	0.32	5.00	2.00	.0000	.0072	.0000	.0000	.10	1.90	....	..
	1904														
1979	May 23	None	None	None	0.3	3.50	0.50	.0000	.0046	.0000	.0000	.10	.70	....	..
2467	Oct. 20	None	M. fine	S. musty	0.30	3.6	1.0	.0000	.0080	.0000	.0000	.10	0.7	....	..
2468	Oct. 20	None	None	V. slight	0.40	4.9	3.0	.0000	.0046	.0000	.0000	.25	2.0	...	..
	1905														
2697	Feb. 14	None	None	V. slight	0.25	3.7	2.0	.0010	.0034	.0200	.0000	.12	0.6	....	..
3197	Sept. 25	None	None	None	0.40	5.3	3.0	.0006	.0096	.0050	.0000	.15	1.9	....	..
	1906														
3447	Feb. 5	None	None	None	0.10	3.0	1.2	.0010	.0032	.0050	.0000	.17	0.8	....	..

Twenty-one private supplies were examined. Of this number, eight were found of good quality, three were classed as doubtful or in poor condition, three were polluted and seven contained excessive quantities of lead.

PIERMONT.—No public supply. Both of the private supplies examined were found good.

PITTSBURG.—No public supply. Practically every house has its individual spring. The water is conveyed through iron pipe and wood pump logs. There is an abundance of spring water on the hillsides.

PITTSFIELD.—The Pittsfield Aqueduct Company installed a system of water works in 1884. The source is a pond one half mile long and an average of one eighth mile wide; average depth some ten feet, bottom largely stone and gravel. A little more than half the watershed, one

mile by three fourths of a mile, is wooded; not over six permanent inhabitants. This pond has no visible inlet, but is fed from its own bottom.

The force is gravity, through an open brook for a mile descending constantly, over a gravelly and rocky bottom; capacity, 1,500,000 gallons. There are four miles of distributing mains, largely cement lined; service pipes, cement lined, plain iron, and galvanized iron. Four hundred families, substantially the whole village, are takers. Very few wells within the area.

Chemical Analysis of Water from the Pittsfield Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1112	1903 Mar. 30	Distinct	Much fine	Veg.	0.2	3.90	1 70	.0024	.0046	.0100	.0001	.15	0.7	....	..
1117	April 1	Distinct	Much fine	Veg.	0.22	5.30	2.30	.0000	.0042	.0150	.0000	.15	1.40	....	..
1456	Aug. 19	V. slight	V. slight	Dec. vg.	0.22	2.70	1.10	.0000	.0068	.0000	.0000	.15	1.10	....	..
1984	1904 May 24	Slight	Slight fine	Slight musty	0.15	8.00	3.20	.0020	.0046	.0000	.0000	.13	1.90	....	..
2750	1905 Mar. 13	None	None	None	0.1	6.0	4.0	.0096	.0050	.0150	.0005	.15	0.3	....	..
3194	Sept. 25	None	Slight	Foul	0.15	2.9	1.6	.0008	.0084	.0050	.0000	.17	1.2	....	..
3456	1906 Feb. 12	None	V. slight	Veg.	0.10	2.8	2.0	.0014	.0074	.0050	.0000	.42	0.7	....	..
3878	Aug. 22	None	Consid.	Earthy	0.20	5.7	1.4	.0016	.0192	.0000	.0000	.12	0.1	....	*a*
3879	Aug. 22	Consid.	Consid.	S.earthy	0.20	6.0	1.9	.0028	.0184	.0000	.0000	.12	0.1	....	*b*

a From pond; *b* from reservoir.

One private supply examined was found to be unfit for use.

Plainfield.—A private supply was introduced in 1890–'91 by the Meriden Water Company. The source of the supply is springs dug from 7 to 10 feet deep, and flowing from 10 to 30 gallons per minute. The watershed has an area of about 100 acres, all cleared. The water flows by gravity to two reservoirs, one 20 x 25 x 8 feet, and having a capacity of 1,000 barrels; the other 13 feet in diameter by 12 feet deep. Plain wrought iron pipe. Twenty families, besides the hotel and boarding house, are supplied from this source. There are many individual wells in the locality.

Chemical Examination of Water from Tap of Meriden Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
860	1902 Oct. 13	Marked	Much min.	Slight	0.1	10.00	5.00	.0000	.0000	.0000	.0000	.06	4.50	...	..
1974	1904 May 23	None	None	S.earthy	0.0	5.60	4.70	.0024	.0038	.0300	.0000	.10	4.50	...	..
2595	Dec. 14	None	None	None	0.00	7.0	5.1	.0000	.0014	.0300	.0000	.30	3.7	...	..
2691	1905 Feb. 9	None	S. fine	None	0.05	9.2	6.0	.0000	.0000	.0150	.0000	.12	3.5	...	..
3179	Sept. 19	Slight	None	None	0.10	6.4	4.4	.0010	.0082	.0050	.0000	.05	3.1	...	..
3201	Sept. 27	None	Slight	S.earthy	0.10	14.6	11.4	.0008	.0064	.2000	.0000	.57	8.2	...	a
3432	1906 Feb. 1	None	None	None	0.0	6.7	4.3	.0008	.0014	.0080	.0000	.05	2.6	...	..

a Pond supplying ice.

Six private supplies were examined, of which number three were found of good quality, one was classed as doubtful, and two were unfit for use.

Plaistow.—Most of the supply is from private wells. Four examinations were made of private supplies. One of these was found of good quality, two were polluted and two were unfit for use because of much lead.

Plymouth.—The town installed a system of water works in 1880 and 1881, the supply being from springs and wells. The average depth of the wells is six feet. A foot of top soil is loam; below the loam is marl and gravel. The wells are dug. The water flows by gravity to two reservoirs having a capacity of 4,000,000 gallons; area, one acre; average depth, 12 feet. There are six miles of cement lines, and two miles of cast iron mains, with galvanized iron service pipes. Fifteen per cent. of the population take this water. There are about twenty-five private wells also in use.

Chemical Examination of Water from Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
	1902														
627	June 30	V. slight	None	Veg.	0.25	8.00	3.10	.0000	.0054	.0000	.0000	.10	2.30	....	*
629	June 30	Slight	Slight	Veg.	0.26	7.80	3.10	.0006	.0084	.0000	.0000	.12	2.30	....	†
630	June 30	Slight	Slight	Dec. vg.	0.26	8.10	2 00	.0006	.0120	.0000	.0000	.07	1.90	....	‡
631	June 30	Slight	None	Dec. vg.	0.26	6.40	2.50	.0000	.0072	.0000	.0000	.07	1.90	....	§
	1903														
1406	Aug. 5	V. slight	Slight	V. slight	0.2	5.00	2.70	.0000	.0026	.0000	.0000	.07	2.40	....	..
1585	Oct. 12	None	V. slight	None	0.25	7.40	4.70	.0016	.0052	.0150	.0000	.20	3.10	....	‖
1586	Oct. 12	None	Slight	None	0.2	7.10	3.80	.0000	.0036	.0200	.0000	.20	3.60	....	§§
	1904														
1992	May 27	Slight	Slight	Dec. vg.	0.25	5.20	2.60	.0008	.0042	.0000	.0000	.10	1.80	....	..
	1905														
2702	Feb. 14	None	V. slight	None	0.10	5.7	4.7	.0000	.0000	.0200	.0000	.08	1.9	....	..
3205	Sept. 28	V. slight	S. fine	M. veg.	0.30	6.0	3.7	.0014	.0144	.0100	.0000	.05	2.0	....	..
3301	Nov. 20	V. slight	Slight	M. veg.	0.30	6.6	4.0	.0044	.0164	.0100	.0000	.20	2.4	....	‡
3302	Nov. 20	None	V. slight	S. earthy	0.20	5.5	3.5	.0010	.0048	.0150	.0000	.07	2.0	....	†
	1906														
3443	Feb. 6	None	V. slight	None	0.10	5.5	3.5	.0006	.0034	.0100	.0000	.07	2.3	....	..
3974	Sept. 12	None	V. slight	S. veg.	0.05	9.0	4.5	.0010	.0028	.0100	.0000	.05	1.9	....	..

*** Sample taken from faucet in mill.**
† Sample taken from Reservoir No. 1.
‡ Sample taken from Reservoir No. 2.
§ Sample taken from faucet in drug store.
‖ Stream to Reservoir No 2.
§§ Stream to Reservoir No. 1.

Ten private supplies were investigated. One of these was found of good quality, two were considered doubtful, one was polluted and six contained too much lead for safety.

PORTSMOUTH.—The city constructed a system of water works in 1891, the source being wells and springs. The watershed is about four square miles in area, partly wooded; no inhabitants very near. The wells are driven from 70 to 100 feet, in gravel. The water is pumped to a standpipe having a capacity of 500,000 gallons. There are very few private wells.

Thirteen private supplies were examined, of which seven proved of good quality, five polluted and one contained much lead.

Chemical Examination of Water from Portsmouth Water Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
621	1902 June 27	None	Slight floc.	S. arom.	0.0	10.40	8.80	.0000	.0018	.0150	.0000	.27	4.50	..	...
1405	1903 Aug. 4	None	Slight	None	0.0	16.50	11.10	.0000	.0010	.0500	.0003	.57	8.70	..	...
2774	1905 Feb. 24	Slight	Slight	Peculiar	0.10	39.7	33.5	.0094	.0044	.2000	.0066	6.12	12.5	..	*a
2781	Mar. 29	V. mark.	M. floc.	Dec. vg.	0.60	5.7	2.6	.0000	.0082	.0150	.0000	.32	0.9	..	b
2881	1906 June 2	None	None	None	0.10	18.0	13.7	.0014	.0014	.2000	.0010	.70	10.3	..	c
2992	July 18	None	None	None	0.10	24.2	20.2	.0000	.0020	.0200	.0000	5.70	8.2	..	d
3019	July 26	S. opal.	Slight	.....	....	.....	.....	.0032	.0032	.1200	.0020	6.40	....	..	d
3045	Aug. 3	None	S. veg.	Veg.	0.55	12.5	9.0	.0010	.0112	.0500	.0000	.54	5.4	..	e

* B. coli present; *a* Madison Street reservoir; *b* reservoir Peverly Springs; *c* fountain head, newly driven well; *d* Hanover Street reservoir; *e* Peverly Spring Brook.

Chemical Examination of Water Taken from Various Sources at U. S. Navy Yard.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2444	1904 Oct. 17	None	V. slight	S. veg.	0.10	18.8	14.5	.0016	.0026	.0500	.0000	.95	9.8	..	a
2445	Oct. 17	None	None	None	0.0	26.3	21.2	.0014	.0010	.2000	.0000	1.27	12.5+	..	*b
2446	Oct. 17	Marked	V. much	D. foul	0.45	16.4	13.3	.0080	.0020	.0000	.0000	4.00	7.5	..	*c
2447	Oct. 17	Slight	Slight	D. foul	0.15	67.3	50.5	.0106	.0036	.5000	.0200	6.2	12.5+	..	*d
2448	Oct. 17	Slight	Slight	None	0.15	42.4	37.6	.0050	.0010	.0000	.0001	1.77	12.5+	..	*e
2449	Oct. 17	Slight	Consid.	Slight	0.15	39.5	31.2	.0010	.0030	.6000	.0030	3.10	12.5+	..	*f
2450	Oct. 17	None	Slight	None	0.00	14.0	10.2	.0000	.0024	.2000	.0000	1.17	8.1	..	g
2451	Oct. 17	Marked	Much	V. slight	0.15	13.6	9.9	.0000	.0034	.0000	.0008	1.55	6.1	..	*h
2452	Oct. 17	Marked	Much	V. slight	0.40	8.7	5.8	.0000	.0374	.0000	.0000	.80	3.5	..	*i
2453	Oct. 17	None	Slight	Veg.	0.70	4.3	2.2	.0022	.0120	.0000	.0000	1.35	1.5	..	j
2525	Nov. 8	None	Slight	None	0.10	31.2	24.9	.0040	.0014	.2000	.0040	4.90	12.9+	..	*k
2526	Nov. 8	Slight	Consid.	None	0.20	22.1	17.8	.0000	.0010	.3000	.0080	.95	10.6	..	*l
2527	Nov. 8	Slight	Consid.	V. slight	0.20	5.3	3.2	.0014	.0044	.0900	.0060	.45	3.1	..	m
2528	Nov. 8	Slight	Slight	None	0.10	2.2	1.6	.0000	.0000	.0200	.0000	.25	1.5	..	n
2529	Nov. 8	Slight	Slight	None	0.00	14.6	10.4	.0000	.0014	.0250	.0000	.90	6.7	..	*o

* *B. coli* present; *a* well in Navy Yard A; *b* well B; *c* well C; *d* well D; *e* well E; *f* well F; *g* well G; *h* well H; *i* pond in Navy Yard I; *j* pond in Navy Yard J; *k* well in Navy Yard Y 11; *l* well in Navy Yard W 12; *m* well and rain water X 13; *n* cistern in Navy Yard Y 14; *o* well in Navy Yard C 15.

RANDOLPH.—All the inhabitants, summer boarding-houses and summer cottages get water from springs. Only two wells in use in town.

RAYMOND.—In 1893 the town installed a public water supply from a system of wells driven from 40 to 60 feet deep, through loam, sand and gravel. The water is pumped to a standpipe having a capacity of 118,037 gallons. The watershed is about one square mile in area, is about equally wooded and cleared, and on it are about 600 inhabitants. There are a few wells in the locality.

Chemical Examination of Water from Faucet of Raymond Water Works.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
376	1902 Jan. 24	None	None	V. slight	0.0	11.90	8.50	.0010	.0064	.1900	.0000	1.62	4.20	...	..
1404	1903 Aug. 4	Slight	V. S. fine	Slight	0.0	18.10	11.90	.0030	.0020	.2900	.0002	2.15	6.00	...	..
2018	1904 June 6	None	None	None	0.05	19.10	14.20	.0010	.0020	.4000	.0000	2.65	7.70	...	..
2695	1905 Feb. 14	None	None	Slight	0.0	14.2	10.8	.0000	.0000	.3000	.0000	2.50	4.1	...	..
3195	Sept. 25	Slight	S. ferrug.	Slight	0.08	15.9	10.1	.0006	.0030	.2000	.0000	1.95	4.6	...	..
3441	1906 Feb. 5	None	None	Slight	0.05	14.5	11.8	.0006	.0034	.0500	.0000	2.21	4.6	...	..

RICHMOND.—Wells and springs, about 12 to 30 feet deep, in sandy loam, furnish water for this town.

RINDGE.—Each dwelling has its individual well. Of the nine supplies investigated but one was found of good quality, seven being polluted and one unfit for use because of much lead.

ROCHESTER.—The Rochester Water Works, owned by the city, installed in 1885, has for a source a pond and reservoir, the pond being about one hundred acres, and the reservoir two hundred acres in area. The watershed, several square miles in extent, is both wooded and cleared, with, perhaps, 75 inhabitants. There are not many private wells in the locality.

Chemical Examination of Water from Tap of City Supply, Rochester.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
878	1902 Oct. 17	None	None	Slight veg.	0.15	5.70	1.00	.0000	.0086	.0000	.0000	.15	.90	....	..
1436	1903 Aug. 13	Very marked	Much fine veg.	Peculiar veg.	0.35	7.00	2.10	.0036	.0560	.0000	.0000	.20	0.40	....	..
2020	1904 June 6	Slight	Consid. fine	Dec. m'styvg.	0.2	3.10	2.20	.0020	.0198	.0000	.0000	.15	2.00	....	..
2700	1905 Feb. 15	None	None	V. slight	0.3	3.5	2.0	.0140	.0088	.0300	.0000	.22	0.4	....	..
3446	1906 Feb. 6	None	None	V. slight	0.10	2.7	1.1	.0006	.0064	.0050	.0000	.17	0.3	....	..

Of the seven private supplies examined, three were found of good quality, one was classed as doubtful, and three were reported as unfit for use.

Rollinsford.—No public or private water companies. Three private supplies were examined, one being found of good quality, the other two unfit for use.

Rumney.—Water is obtained from private wells and springs. Examinations of four such showed all to be of good quality, though one contained too much lead for safety.

Rye.—The water supply is wholly from wells and springs. The ground is gravel, with an underlying stratum of hardpan, which is about like stone. The underground flow is large, there being no natural ponds or streams of any size in the town. All three of the private supplies examined were found to be polluted.

Salem.—A private water supply was installed in 1903 by the Salem Water Works Company. The source of the supply, Canobie Lake, is of about 1,000 acres in area, 40 feet in depth on an average, and gravelly bottom. The watershed is approximately 500 acres, mostly wooded. The shores of the pond, upon which is Canobie Lake Park, is frequented by summer cottagers and excursionists. The water flows by gravity through about three miles and a half of iron main pipe, and the service pipes are of galvanized iron. It is estimated that 15 per cent. of the population use this water.

Chemical Examination of Water taken from Policy Pond, otherwise known as Canobie Lake.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites				
228	1901 Oct. 27	None	Slight	Dec.veg.	0.1	2.80	1.50	.0000	.0176	.0000	.0000	.21	1.20	....	*
229	Oct. 27	None	Slight	Dec.veg.	0.1	3.00	1.20	.0000	.0192	.0000	.0000	.23	1.20	....	†
2045	1904 June 13	Slight	Slight	Marked veg.	0.05	6.20	2.80	.0014	.0136	.0000	.0000	.30	2.60	....	..
2706	1905 Feb. 20	None	S. floc.	Dec.veg.	0.00	3.7	2.1	.0010	.0060	.0800	.0000	.30	0.6	....	..
3203	Sept. 28	None	None	S. foul	0.10	3.7	1.7	.0008	.0080	.0050	.0000	.37	1.1	....	..
3832	1906 Aug. 9	None	None	None	0.10	4.2	2.7	.0014	.0082	.0050	.0000	.35	0.6	....	..

* Sample No. 228 was collected opposite Crosse's Grove.
† No. 229 opposite Chase's Grove.
*† B. Coli present; check sample negative.

The single private supply examined was found unfit for use.

SALISBURY.—No public supply. One private supply examined was found to be polluted.

SANBORNTON.—No public or private companies. Four private supplies examined included one good, one of doubtful quality, one polluted, and one containing an excess of lead.

SANDOWN.—No public supply. The single private supply examined was classed as of doubtful quality.

SANDWICH.—No public supply. Two of the three supplies examined were found of good quality, the third being unfit for use.

SEABROOK—No public supply. Two supplies examined, one unfit for use, the other considered doubtful.

SHARON.—No public supply.

SHELBURNE.—No public supply.

SOMERSWORTH.—A system of water works was constructed in 1905–'06. The water is taken from Salmon Falls River directly to a filter-bed of modern construction and capable of filtering about 1,500,000 gallons in 24 hours. The water is pumped from the storage channels of the filter-bed to a standpipe of ample capacity, from which it is distributed about the city.

The sand filter referred to is constructed after the plans of the Filtration Experiment Station, at Lawrence, Mass., and is the only one of the kind in this state. The entire plant, pumping station, filtering-bed and standpipe is a model of construction and a credit to the city.

Chemical Examination of Water from Faucet of City Water Works, Somersworth.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
60	1901 July 11	None	None	Dec.veg.	0.7	4.50	2.50	.0074	.0167	.0050	.0003	.33	1.80	...	...
497	1902 May 5	None	None	Veg.	0.5	4.00	1.90	.0006	.0056	.0200	.0000	.15	1.20	...	...
585	June 11	None	None	S. veg.	0.55	6.60	1.50	.0000	.0092	.0200	.0000	.14	1.20	...	...
647	July 14	None	None	Dec.veg.	0.6	4.70	2.20	.0000	.0098	.0200	.0000	.14	1.80	...	...
657	July 17	None	V. slight	V. slight	0.5	6.10	2.20	.0020	.0154	.0200	.0000	.15	2.20	...	...
788	Sept. 9	None	None	S. veg.	0 45	8.30	2.40	.0014	.0100	.0100	.0000	.15	2.40	...	...
935	Nov. 21	None	None	S. veg.	0.5	5.20	1.60	.0000	.0082	.0000	.0000	.20	1.60	...	...
1018	1903 Jan. 30	None	None	Veg.	0.5	8.40	2.40	.0000	.0060	.0000	.0000	.15	2.30	...	...
1312	July 8	None	V. slight	V. S. v'g	0.6	5.50	1.20	.0000	0046	.0150	.0000	.08	1.2	...	...
1424	Aug. 10	None	V. Slight	Veg.	0.4	5.90	2.30	.0000	.0086	.0300	.0000	.20	2.30	...	...
1832	1904 Feb. 9	Slight	None	M. veg.	0.4	4.70	2.40	.0018	.0046	.0000	.0000	.20	2.00	...	...
2007	May 31	None	Slight	V. slight	0.45	5.80	1.90	.0000	.0048	.0000	.0090	.18	1.50	...	...
2199	July 25	None	None	V. slight	0.4	6 80	3.70	.0006	.0038	.0000	.0000	.25	3.70	...	...
2619	Dec. 30	None	None	None	0.15	6.2	3.7	.0000	.0000	.0150	.0002	.21	1.9	...	...
2620	Dec. 30	None	Much	V. slight	0.15	5.3	3.3	.0000	.0020	.0150	.0000	.21	1.9	...	...
2714	1905 Feb. 21	None	None	S. veg.	0.30	6.5	3.3	.0000	.0010	.0250	.0000	.25	1.4	...	*
2760	Mar. 21	Marked	V. much	Dec.veg.	0.35	6.0	3.8	.0014	.0060	.0000	.0000	.20	1.2	...	*a
2761	Mar. 21	Marked	V. much	Dec.veg.	0.35	6.1	2.9	.0000	.0092	.0000	.0000	.20	1.2	...	*b
2762	Mar. 21	Marked	V. much	Dec.veg.	0.55	5.7	2.8	.0026	.0086	.0000	.0000	.30	1.1	...	...
3075	Aug. 14	None	None	None	0.60	6.3	3.0	.0008	.0128	.0100	.0000	.25	1.8	...	...
3463	1906 Feb. 13	None	V. slight	Slight	0.40	5.0	3.0	.0006	.0014	.0050	.0000	.20	1.6	...	...

* B. Coli present; *a* Salmon Falls River, 500 feet from leatherboard factory; *b* Salmon Falls River, 1,000 feet below mills and town sewer.

Twelve private supplies were examined. Of this number three were found of good quality, one doubtful, and eight were unfit for use.

SPRINGFIELD.—The water for this town is supplied by private wells and springs. Both of the supplies examined during the past two years were found unfit for use.

STEWARTSTOWN, WEST.—The Consolidated Water Company furnishes water to 25 families, the source being several springs and a few wells, There are still a few deep wells in the locality, dug from 15 to 20 feet. on a level with the river, and which have good supplies of water. The reservoir has a capacity of 16,000 gallons, and the water flows by gravity through two miles of pipe, galvanized iron service pipes. Sixty families, half the population, are supplied.

Chemical Examination of Supply of Consolidated Water Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
3220	1905 Oct. 4	None	Slight	Earthy	0.0	10.3	5.8	.0014	.0014	.0350	.0004	.25	5.0	....	..

All four of the private supplies examined were found of good quality.

STODDARD.—No public supply. Most of the families are supplied from individual wells; a few from Long Lake.

STRAFFORD.—No public supply. Two supplies investigated were classed as doubtful or polluted, and one of these shows an excess of lead.

STRATFORD.—The village of North Stratford has two private water supplies. In 1882 Mr. Clark Stevens installed a supply from a system of springs, the watershed being about sixty acres, mostly cleared land, no inhabitants. The springs are seven in number, stoned from five to seven feet deep. In 1888, Mr. J. C. Hutchins introduced a second supply, also from springs stoned about six feet deep, with same kind of soil as first supply. The watershed is about five square miles in area, mostly cleared land, no inhabitants. The water is distributed, by gravity, through three miles of galvanized iron pipe, both service and mains. Sixty families, 95 per cent. of the population, take this water.

The single private supply examined was found to be polluted.

Chemical Examination of Water of Stratford.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
800	1902 Sept. 11	None	None	None	0.0	5.60	2.20	.0010	.0030	.0150	.0000	.05	1.90	....	*
801	Sept. 13	None	None	None	0.0	6.10	2.10	.0000	.0000	.0200	.0000	.05	2.00	....	†
3261	1905 Oct. 27	None	None	None	0.10	7.3	3.8	.0010	.0042	.0300	.0000	.05	2.4	....	†
3262	Oct. 27	None	V. sligat	V. slight	0.30	7.5	3.9	.0014	.0048	.0100	.0000	.05	1.9	....	*
3513	1906 Mar. 9	None	None	None	0.05	4.0	2.3	.0008	.0016	.0100	.0000	.12	1.8	....	*
3514	Mar. 9	None	None	S. fishy	0.05	7.2	3.6	.0008	.0016	.0100	.0000	.05	2.7	....	†

*** Taken from faucet of J. C. Hutchins' water supply. † From faucet of Clark Stevens' water supply.**

STRATHAM.—No public or private water companies.

SULLIVAN.—No public supply.

SUNAPEE.—The Sunapee Water Works, owned by the town, were built in 1900, Sunapee Lake being the source from which water is taken to supply the Sunapee village, and Ledge Pond for George's Mills. Water from the pond flows by gravity, while that from the lake is pumped to a reservoir of 300,000 gallons' capacity. There are about five miles of distributing mains of cast iron and galvanized iron pipes. About one hundred and twenty-five families—some 80 per cent. of the population—are using this supply. The Lake Sunapee Water Supply Company, a private company of 23 stock owners and takers, installed its works in October, 1886. The water is taken from Sunapee Lake, and flows by gravity. The plant is nearly worthless at this time, as the pipes are of small size and filled with rust.

Thirteen private supplies were investigated, five being found in good condition, three doubtful, two polluted and three containing too much lead for safety.

Chemical Examination of Water from Lake Sunapee.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
306	1901 Dec. 4	Slight	M. floc.	Dec. veg.	0.6	3.00	1.80	.0000	.0094	.0000	.0000	.08	1.50	.0400	*
823	1902 Sept 22	None	Slight	S. musty	0.1	3.50	.60	.0000	.0112	.0000	.0000	.07	.60	.....	†
824	Sept. 22	None	V. slight	Dec. veg.	0.15	3.40	.70	.0000	.0090	.0000	.0000	.10	.60	.....	..
1418	1903 Aug. 10	V. slight	V. slight	V. dec. veg.	0.1	3.60	2.80	.0000	.0080	.0400	.0000	.07	2.80	.....	..
1419	Aug. 10	None	V. slight	Dec. veg.	0.05	3.50	0.90	.0000	.0122	.0000	.0000	.05	.90	.....	..
2019	1904 June 6	None	V. slight	S. foul	0.2	3.50	2.10	.0012	.0052	.0000	.0000	.10	2.00	.....	..
2713	1905 Feb. 21	V. slight	Slight	Slight	0.10	3.6	1.9	.0000	.0014	.0900	.0000	.10	0.6	.....	..
3237	Oct. 17	None	None	S. veg.	0.10	4.0	1.4	.0010	.0058	.0050	.0000	.05	0.9	.....	..
3468	1906 Feb. 19	None	None	None	0.00	3.5	2.0	.0010	.0038	.0050	.0000	.10	0.7	.....	..
3471	Feb. 21	None	None	S. veg.	0.10	3.0	2.0	.0010	.0038	.0100	.0000	.10	0.9	.....	†
3862	Aug. 20	None	None	None	0.20	3.7	2.2	.0026	.0094	.0100	.0000	.10	0.4	.. ..	..
3894	Aug. 23	V. slight	V. slight	M. earthy	0.10	3.9	2.4	.0014	.0094	.0050	.0000	.10	0 4	.....	†

* Sample taken from private supply through 150 feet of lead pipe.
† Sample taken from Ledge Pond, George's Mills water supply.

Sutton.—One well, owned by the town, furnishes water through a lead pipe, some 500 or 600 feet, to a trough, one end for horses, and from the other several families get their drinking-water. Of the eight private supplies analyzed five proved of good quality, one was classed as doubtful, one was polluted and the eighth contained too much lead.

Swanzey.—No public supply. Eight private supplies analyzed included three of good quality, one classed as doubtful, three polluted and one with an excessive quantity of lead.

Tamworth.—No public supply. Water is obtained from individual springs and wells. One private supply examined was reported as of questionable quality.

Temple.—No public and no private system of water works. Water is obtained from individual springs, which flow by gravity and from wells. Of the six supplies examined four were found to be of good quality, one

was polluted and one contained too much lead for safety. One sample of ice examined was considered as of suspicious quality.

THORNTON.—No public supply. Water is obtained from springs and wells, through lead and iron pipes. The single supply examined was found of good quality.

TILTON.—A private supply was installed by the Tilton and Northfield Aqueduct Company in 1887–'88, the source being a pond of about sixty acres in area, from 10 to 75 feet deep; sand and gravel bottom, with but very little mud. The watershed is several hundred acres in extent, wooded and pasture, with five farms. (For analysis of this supply see Northfield.) Mostly cement-lined pipe is used; some iron. There are still a very few wells in the locality, although most of them have been abandoned.

Three private supplies were examined, two of which were found unfit for use and the third reported as of questionable quality.

TROY.—The water supply is entirely from private wells. Ten supplies were investigated, three of which were found to be good, five polluted, and two contained an excess of lead.

TUFTONBOROUGH.—The water supply of the town consists of private wells and springs, of which nearly every family has one or more. There are several watering-troughs by the roadside which are fed by springs near by. These watering places are paid for by the town at the rate of three dollars each per year. Of the three supplies examined, two were found of good quality, the third polluted.

UNITY.—This is a farming town wholly. Most of the people obtain water from common wells. A few families have spring water.

WAKEFIELD.—The water supply is from wells, dug to an average depth of 15 feet, through sand and ledge.

The health officer, W. S. Davis, M. D., writes: "In the villages of Union and Wakefield, in the town of Wakefield, the water supply is the same; viz., wells, all contaminated with sewage. I wish the State Board of Health would compel this town to put in a system of water supply. I am using distilled water for drinking and cooking purposes. From your analyses of water I have sent you, there can be no doubt of the quality of the water here."

Twenty-six private supplies were investigated. This number included three found of good quality, two classed as questionable, twenty polluted and one with an excess of lead.

WALPOLE.—The Walpole Water & Sewer Company inaugurated a system of water works in 1904. It consists of a reservoir having an area of about two acres and an average depth of about 10 feet, constructed on a small stream. The site was stripped to a gravel and hard dirt bottom. The watershed is about six tenths of a square mile, wooded and cleared. Two families at a considerable distance from brook.

The force is gravity, four miles of coated cast iron mains, with galvanized iron service pipes, being used. Eighty families, 50 per cent. of the population of Walpole village, have this supply. There are many private wells within the area.

The water from the reservoir above referred to flows through a filter plant; thence into a distributing reservoir of concrete construction, covered on top, of about 50 feet diameter, 18 feet deep; capacity about 250,000 gallons.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2082	1904 June 20	None	S. floc.	S. musty	0.1	7.30	4.60	.0048	.0032	.0200	.0000	.15	4.10	....	..
2119	July 3	Slight	Slight	S. veg.	0.1	5.50	3.90	.0052	.0038	.0000	.0000	.15	3.20	....	*
2591	Dec. 13	None	Slight	M. foul	1.5	6.3	4.0	.0000	.0034	.0000	.0001	.20	3.2	....	..
2779	1905 Mar. 26	None	Slight	Dec. vg.	0.2	5.3	3.5	.0000	.0030	.0150	.0000	.10	1.9	....	..
2994	July 18	V. slight	Much	Dec. vg.	0.8	7.7	4.4	.0024	.0142	.0050	.0000	.07	3.1	....	..
3476	1906 Feb. 19	None	None	None	0.0	5.8	3.8	.0014	.0014	.0050	.0000	.12	2.4	....	*†
3640	May 30	None	Slight	None	0.05	2.0	1.0	.0010	.0040	.0100	.0000	.15	....	....	..
3641	May 30	None	None	Slight	0.10	4.5	3.0	.0010	.0014	.0050	.0000	.25	1.6	....	..

* B. coli present; *† B. coli present but not detected in check sample.

Four private supplies were examined, three of which were found to be unfit for use.

WARNER.—In 1895 a supply was introduced by private parties, which was later purchased by the Warner Village Fire District. This consists of a reservoir supplied by springs and a brook. The bottom is clayey hardpan in part, and part gravel; average depth, eight feet. Cast iron and galvanized iron pipe is used. The watershed is estimated at 400 acres, wooded not more than 12 inhabitants. The volume of water varies

greatly. The water flows by gravity. There are quite a number of private wells in the locality. There are many private supplies which are piped from springs long distances through lead pipe.

Chemical Examination of Water from a Faucet of the Village District Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
754	1902 Aug. 29	None	None	V. slight	0.3	5.30	2.00	.0000	.0110	.0000	.0000	.10	1.50	....	..
1417	1903 Aug. 10	Slight	Fine	Foul vg.	0.1	4.20	1.60	.0000	.0106	.0000	.0000	.08	1.60	....	..
2122	1904 July 6	Slight	S. fine	S. veg.	0.25	5.60	2.10	.0000	.0050	.0000	.0000	.10	1.20	...	..
2715	1905 Feb. 22	None	None	V. slight	0.10	5.3	3.2	.0000	.0010	.0000	.0000	.12	1.2	....	..
3470	1906 Feb. 19	None	None	None	0.05	2.5	1.8	.0010	.0020	.0100	.0000	.15	1.1	....	..

Sixteen private supplies were examined, this number including six of good quality, one classed as doubtful, seven polluted and two with an excess of lead.

Warren.—There are two private systems of water works in town; one, the Warren Water Works, was built in 1873, the source being a spring about a mile distant. The water flows by gravity through galvanized iron pipe. Nineteen families are supplied from this source. The other supply, the H. N. Merrill Water Works, was installed about the year 1895. This supply is from a spring and driven well 474 feet deep. The water flows partly by gravity and partly by being pumped into a reservoir. Ten per cent. of the population, 24 families, take this water, which is delivered through one mile of iron main and galvanized iron service pipes. Several families have private supplies, pipes from springs on elevated ground. There are not many private wells within the radius of these supplies.

Of the nine private supplies investigated, two were found of good quality, six were polluted, and one contained too much lead for safety.

Chemical Examination of Water from Various Sources.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
875	1902 Oct. 17	Slight	Fine	V. slight	0.1	7.20	2.60	.0000	.0116	.0000	.0500	.09	1.95	...	*a*
877	Oct. 17	None	None	S. veg.	0.1	6.50	2.70	.0000	.0038	.0000	.0000	.10	2.70	...	*b*
3227	1905 Oct. 10	None	None	None	0.05	5.4	2.1	.0020	.0020	.0100	.0000	.12	1.1	...	*b*
3472	1906 Feb. 22	None	None	None	0.0	8.5	7.5	.0040	.0010	.0100	.0000	.10	4.6	...	*ac*
3473	Feb. 22	V. slight	V. slight	None	0.0	2.9	2.3	.0030	.0024	.0100	.0000	.10	1.4	...	*ad*

a From H. N. Merrill Water Works; *b* from Warren Water Works; *c* from well; *d* from spring.

WASHINGTON.—No public supply. Most of the families have water from wells, dug, while some have spring water through lead or iron pipe.

WATERVILLE.—No public supply.

WEARE.—No public supply. Ten private supplies were analyzed, three of which were found good, four polluted, and four contained an excess of lead.

WEBSTER.—Water is obtained from private wells and springs. Two private supplies were analyzed, one of these being found polluted.

WENTWORTH.—The water supply is from private springs. Two waters received from this town were both found to be of good quality, though one contained lead.

WESTMORELAND.—No public or private water systems. The single supply investigated was found to be polluted.

WHITEFIELD.—Tbe public water works, owned by the town, were built by private parties in 1892. There are two watersheds of about 30 acres each. The water flows by gravity to a reservoir having a capacity of about 1,000,000 gallons, and is delivered through five miles of cast iron mains, galvanized iron service pipes, to about 300 families, seven eighths of the entire population. There are no private wells within the radius of this system.

Chemical Examination of Water from Town Supply.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
861	1902 Oct. 14	None	Slight floc.	Veg.	0.0	5.00	1.50	.0000	.0026	.0000	.0000	.04	1.50	....	..
2143	1903 July 11	None	None	S. veg.	0.1	6.60	2.60	.0050	.0034	.0000	.0000	.05	1.40	....	..
2429	Aug. 11	None	None	V. slight	0.0	4.40	2.40	.0022	.0058	.0000	.0000	.07	1.60	....	..
2718	1905 Feb. 23	None	None	None	0.0	4.4	3.0	.0000	.0014	.0300	.0000	.10	1.5	....	..
3133	Oct. 17	None	None	None	0.15	3.9	2.9	.0008	.0048	.0100	.0000	.05	0.6	....	..
3484	1906 Feb. 17	None	None	None	0.10	4.8	3.0	.0010	.0052	.0200	.0000	.05	0.9	....	..

One polluted private supply was reported.

Wilmot.—The water supply of this town is from private springs or wells. All five of the supplies examined were found in good condition, organically, though one contained too much lead for safety.

Wilton.—The source of the supply is Mill Brook, with the intake at Gaerwen Falls, 250 feet above the bridge at East Wilton, about 1¾ miles from the village. Mill Brook, or Gaerwen Falls Brook, rises on the eastern slope of the Pack Monadnock range of mountains, and has a watershed of nearly four square miles. It is also the outlet of Burton Pond, a sheet of water some 60 acres in extent which is dammed and will serve as an admirable storage reservoir. There is seven miles of 12-inch iron mains, with galvanized iron service pipes, through which the water is delivered by gravity to about 100 families. There are some private wells within the area.

Chemical Analysis of Water from Gaerwen Falls.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1869	1904 Mar. 13	None	S. floc. vg.	Marked veg.	0.2	4.30	2.10	.0010	.0048	.0000	.0000	.15	1.25	...	...
1915	May 1	None	Floc. veg.	S. veg.	0.3	2.80	1.20	.0014	.0082	.0000	.0000	.12	.70	...	...
1982	May 23	Slight	Much veg.	Much vg.	0.35	4.80	1.20	.0000	.0076	.0000	.0000	.10	1.10	...	...
2124	July 5	V. slight	Slight	S. veg.	0.25	4 80	1.50	.0000	.0074	.0000	.0000	.15	.70	...	...
2274	Aug. 14	None	V. slight	Musty veg.	0.25	4.20	1.90	.0000	.0034	.0000	.0000	.15	.40	...	*
2363	Sept. 13	V. slight	V. slight	Dec. vg.	0.20	3.70	1.70	.0014	.0028	.0000	.0000	.20	.90	...	*
2471	Oct. 4	Slight	Con. floc.	Dec. vg.	0.4	5.6	2.2	.0044	.0120	.0000	.0000	.35	1.4	...	*a
3342	1905 Oct. 18	None	V. slight	S. earthy	0.3	5.0	2.7	.0040	.0100	.0050	.0000	.25	1.4	...	*a
3271	Oct. 30	None	None	S. veg.	0.28	3.8	1.3	.0010	.0040	.0050	.0000	.27	0.4	...	a
3483	1906 Feb. 26	S. opal.	Slight	Slight	0.20	6.9	3.7	.0020	.0090	.0200	.0000	.22	1.2	...	a

*** B. coli present; *a* reservoir.**

Chemical Analysis of Water from Miller Brook.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1873	1904 Mar. 13	Slight	Slight	V. slight	0.25	3.40	1.70	.0024	.0046	.0000	.0000	.22	1.10	....	..
1983	May 23	Slight	Slight	Much vg.	0.3	4.50	1.40	.0010	.0096	.0000	.0000	.13	1.20	....	*
2126	July 5	Slight	Consid. earthy	S. veg.	0.25	4.80	1.60	.0000	.0032	.0000	.0000	.10	.60	....	..
2276	Aug. 14	V. slight	S. floc. vg.	S. earthy	0.25	6.00	1.50	.0020	.0064	.0000	.0000	.20	.90	....	*
2365	Sept. 13	V. slight	V. slight	V. dec. veg.	0.1	5.20	2.70	.0010	.0044	.0000	.0000	.15	1.70	....	*
2474	Oct. 4	None	S. floc.	Veg.	0.35	6.8	4.5	.0000	.0064	.0000	.0000	.30	1.1	....	*

*** B. coli present.**

Chemical Examination of Water from Burton Pond.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1914	1904 May 1	None	Slight floc.	Vege'ble	0.3	3.20	1.60	.0030	.0104	.0000	.0000	.10	.90	....	..
1986	May 24	Slight	Much fine	Dec.veg.	0.4	4.00	1.00	.0000	.0020	.0000	.0000	.10	.40	....	..
2125	July 5	Slight	Con. fine	Much veg.	0.5	4.30	.70	.0000	.0164	.0000	.0000	.10	.40	...	..
2275	Aug. 14	None	Con. floc.	Musty veg.	0.4	5.60	1.70	.0020	.0158	.0000	.0000	.10	.40	....	*
2364	Sept. 13	V. slight	V. slight	Dec.veg.	0.35	4.20	.90	.0026	.0166	.0000	.0000	.12	1.10	....	..
2473	Oct. 24	Slight	Con. floc.	Much veg.	0.6	3.9	1.4	.0020	.0284	.0000	.0000	.15	.09	....	..

* B. Coli present.

Chemical Examination of Water from Blood Brook.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
1871	1904 Mar. 13	None	Slight	V. S.veg.	0.15	2.70	1.60	.0012	.0054	.0000	.0000	.12	1.25	....	..
2127	July 5	Slight	Slight	S. veg.	0.15	4.10	1.20	.0000	.0066	.0000	.0000	.15	.60	....	..
2273	Aug. 14	None	None	Musty veg.	0.15	3.70	2.30	.0000	.0020	.0000	.0000	.20	.80	....	*
2366	Sept. 13	V. slight	V. slight	Dec.veg.	0.1	4.80	1.50	.0014	.0044	.0000	.0000	.17	1.40	....	*
2472	Oct. 24	None	Con. floc.	Vege'ble	0.15	4.5	1.8	.0034	.0060	.0000	.0000	.10	1.1	....	..

Fifty-one samples representing private sources were examined. Of this number 17 were of good quality, 19 were polluted, 14 contained too much lead for safety, and one was contaminated by zinc.

Winchester.—The whole town is supplied from private wells and springs. The three supplies examined included two polluted and one of questionable quality.

Windham.—There is no public or private water system. There are five watering-troughs for horses in town.

Windsor.—Water is obtained from private springs or wells.

WOLFEBOROUGH.—The public water works, owned and operated by the town, were installed in 1889. The source of the supply is a pond of about 300 acres; depth in places from 60 to 70 feet; average for the pond about 32 feet; bottom mostly sand, with small rocks. The watershed is from three to four square miles in extent; five sevenths woodland, two sevenths pasture; only one family inhabits the watershed. This is a gravity system, with between five and six miles of cast-iron mains and galvanized and wrought iron service pipes. Practically the entire population is supplied from this system.

Chemical Examination of Water from Public Fountain.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
842	1902 Oct. 9	None	None	S. musty	0.0	3.90	1.40	.0000	.0068	.0000	.0000	.07	1.30	....	..
1659	1903 Nov. 9	Slight	Fine	S. veg.	0.0	2.90	1.40	.0010	.0056	.0000	.0000	.08	1.40	....	..
2136	1904 July 5	None	S. fine	V. slight	0.1	2.30	.80	.0000	.0062	.0000	.0000	.15	.90	....	..
2711	1905 Feb. 21	Slight	Slight	Slight	0.00	3.6	1.8	.0000	.0014	.0500	.0000	.00	0.6	....	*a*
3234	Oct. 17	None	Slight	Vege'ble	0.10	2.5	2.5	.6008	.0090	.0100	.0000	.07	0.4	....	..
3506	1906 Mar. 6	None	None	S. veg.	0.10	3.5	1 8	.0014	.0074	.0050	.0000	.15	0.7	....	..
3868	Aug. 20	None	None	None	0 10	2.9	1.2	.0022	.0000	.0050	.0000	.07	0.4	....	..

a From public fountain.

The single private supply examined was found to be polluted.

WOODSTOCK.—In 1897 the North Woodstock Water Company installed a system of water works which was sold to the town of Woodstock. This is in the precinct of North Woodstock. The source is a stream dammed to form a reservoir of about one acre. Seventy families, 99 per cent. in the precinct, are takers. There are no wells in the precinct. The town of Woodstock is about evenly divided into the northern and southern portion. The latter is supplied with water from private wells and springs, and since the removal of all lead pipe, etc., it seems to be of good quality.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2215	1904 July 29	V. slight	V. slight	None	0.7	5.90	1.40	.0010	.0080	.0000	.0000	.05	.70	.....	..
3889	1906 Aug. 22	Gel.	None	Veg.	0.50	.....	....	.0010	.0080	.0050	.0000	.05	0.4	.....	..

Woodsville (village in town of Haverhill).—Woodsville Fire District is supplied with water by the Woodsville Aqueduct Company, whose plant was installed in 1885 by James Gordon, who introduced water from Gordon spring in 1892 or 1893. The first-named supply is from Ammonoosuc River, which receives all the sewage from the towns of Bath, Lisbon and Littleton, farther up the river. The water is pumped directly from the river, and flows through about three miles of iron distributing mains. This supply is from a sewage-polluted river and is a constant source of danger to the users. The State Board of Health has repeatedly warned the public against it. (See former reports of this board.)

This company also supplies water from a spring, dug about four feet deep, which yields about 50,000 gallons daily, delivered through two miles of lead pipe. Soil is mucky loam with sandy bottom. About nine tenths of the population are supplied from these sources.

Gordon spring is about two feet deep, while the volume of water is about 48,000 gallons daily; soil, mucky loam with sandy bottom. One half mile of galvanized iron pipe is used to convey this water. Thirty-three families take from this supply.

Chemical Examination of Water Supply Grafton County Almshouse.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
2568	1904 Nov. 30	Slight	Consid.	Peculiar	0.0	6.2	5.0	.0000	.0014	.0000	.0000	.20	4.5	.....	*a
2585	Dec. 12	Slight	Consid.	None	0.10	8.5	6.0	.0000	.0000	.0300	.0000	.07	3.1	.....	b
2586	Dec. 12	None	Consid.	None	0.0	7.6	4.0	.0000	.0000	.0200	.0001	.12	3.7	.....	a

* B. Coli present; *a* spring; *b* well.

Chemical Examination of Water from Supply of Woodsville Aqueduct Company.

Number.	Date of collection.	Appearance				Residue on Evapo'n		Ammonia		Nitrogen as		Chlorine.	Hardness.	Lead.	
		Turbidity.	Sediment.	Odor.	Color.	Total.	Fixed.	Free.	Albuminoid.	Nitrates.	Nitrites.				
17	1901 June 3	None	Con. floc.	S. veg.	0.1	3.60	1.20	.0014	.0057	.0066	.0000	.13	....	...	...
81	June 3	None	Much floc.	S. veg.	0.1	4.10	1.70	.0046	.0093	.0066	.0000	.13	....	...	...
19	June 3	None	Slight	S. veg.	0.1	3.70	2.20	.0004	.0057	.0066	.0000	.13	.. .	...	...
57	July 9	None	Floc. veg.	Dec.veg.	0.12	5.00	2.00	.0009	.0104	.0050	.0002	.26	2.00	...	...
58	July 9	None	None	Veg.	0.10	4.70	2.10	.0032	.0104	.0050	.0002	.20	....	...	...
59	July 9	None	Much floc. veg.	Dec.veg.	0.12	4.70	2.20	.0032	.0135	.0050	.0002	.20	....	...	...
159	Sept. 12	None	None	Dec.veg.	0.15	5.10	3.30	.0016	.0112	.0000	.0000	.19	....	...	...
160	Sept. 12	None	Floc. veg.	Dec.veg.	0.15	5.60	2.60	.0026	.0126	.0000	.0000	.19	...	...	...
404	1902 Feb. 13	None	V. slight	Veg.	0.1	5.80	3.40	.0006	.0070	.0200	.0000	.10	1.60	...	...
1022	1903 Feb. 2	None	None	S. veg.	0.2	4.30	1.90	.0000	.0048	.0200	.0000	08	1.90	...	...
1023	Feb. 2	None	None	None	0.0	7.30	3.10	.0000	.0014	.0200	.0000	.12	2.90	...	...
1430	Aug. 11	Marked	Much fine veg.	V. slight	0.15	6.60	3.40	.0010	.0074	.0000	.0000	.15	1.80	...	. .
1749	Dec. 18	None	Slight	None	0.0	6.20	4.30	.0004	.0048	.0400	.0002	.13	2.60	...	...
2117	1904 July 4	Slight	Con. floc.	M. veg.	0.2	4.10	2.30	.0108	.0082	.0000	.0000	.15	1.80	...	...
2723	1905 Feb. 25	None	Consid.	V. slight	0.10	5.7	4.0	.0020	.0000	.0200	.0000	.20	1.8	...	...
2811	Apr. 24	None	Slight	None	0.10	7.7	4.6	.0000	.0014	.0050	.0000	.10	2.6	...	*a
2851	May 17	Marked	Slight	None	0.10	6.6	4.0	.0000	.0000	.0150	.0000	.10	2.6	...	a
3499	1906 Mar. 5	None	Consid.	None	0.15	4.0	3.2	.0000	.0080	.0100	.0001	.05	1.5	...	*

***B. Coli present. *a* Child's Brook, proposed supply.**

SPECIAL REPORTS ON WATER SUPPLIES, TYPHOID FEVER, ETC.

ALTON AND ALTON BAY SEWERAGE AND WATER SUPPLY.

One of the sources of water supply of Alton is Alton Bay, so called, from which, in periods of dry weather, water is pumped to the reservoir, with which is connected the distributing main of the system. (See report on page 9.)

The Alton Bay Campmeeting Association, with its several hundred cottages, occupies land owned by the Boston & Maine Railroad, the drainage from which has heretofore entered the lake, or bay, at points but a little below the intake of the water company.

Still further, the sewage from the railway station and from some cottages on the shore of the lake has been allowed to enter the lake. From the campmeeting grounds referred to main sewers were constructed, years ago, and still maintained, with their terminals in the bay.

The condition was, therefore, a dangerous one, particularly during the summer season, contaminating the water of the bay to an extent that certainly rendered it dangerous for domestic purposes. It was imperative that some action should be taken which would prevent the pollution of the bay. The following petition was, therefore, presented to the State Board of Health:

To the State Board of Health of the State of New Hampshire:

The undersigned, board of health and citizens of Alton, in the County of Belknap in said state, have reason to believe that the public water supply of said town, to wit, the waters of Alton Bay in said town, is now being contaminated and is in danger of still further contamination by sewage, and that the local regulations are not sufficient to prevent such pollution. Wherefore, they respectfully request your honorable board to at once investigate the case and establish such regulations as may be deemed necessary for the protection of said water supply against any pollution that may endanger the public health.

(Signed) BOARD OF HEALTH,
By CHARLES E. FIFIELD,
FRANK M. AYER,
CHARLES E. HUTCHINS.

E. F. Thayer,	A. S. French,	E. R. Wright, M. D.,
Benjamin F. West,	C. A. Twombly,	Paul E. Buckley,
L. G. Welch,	Harry Morrison,	G. W. Place,
Lewis H. Lamprey,	Lewis P. Varney,	P. H. Wheeler, M. D.,
L. Dore,	Henry H. Emerson,	Jesse Wilson,
B. F. Kimball,	Jacob Chamberlin,	Charles L. Fifield,
C. A. Glidden,	Everett W. Emerson,	Charles B. McDuffee,
Frank D. Morse,	Will C. Woodman,	George B. Sampson,
John C. Young,	W. Rockwell Clough,	David E. Clough,
Meville Adams,	F. E. Davis,	Ira W. Mitchell,
F. W. Gray,	F. O. M. Tibbetts,	S. E. Colbath,
Percy S. Jones,	S. E. Jones,	H. F. Gilman,
Augustus B. Currier,	Waldo C. Varney,	H. Reynolds,
R. B. Yeaton,	W. E. Sanborn,	Waldo Hurd,
Walter C. Green,	Oscar Duncan,	E. W. Francis,
J. W. Durgin,	Edward W. Cummings,	W. A. Varney,
D. V. Osborne,	Albert J. Jones,	J. H. Fifield.
H. M. Ricker,	E. H. Rollins,	

ALTON, N. H., May 18, 1906.

The foregoing petition was acknowledged as follows:

CONCORD, N. H., June 7, 1905.

Board of Health, Alton, N. H.

GENTLEMEN: The petition of your board and some of the citizens of Alton asking the State Board of Health to investigate certain conditions which are deemed to be dangerous to the public water supply of your town, is received, and has this day been placed before the board at a special meeting.

We shall investigate the matter thoroughly as soon as the case can be reached, which will be about the last of this month or the first of July, as we prefer to see certain conditions when quite a large proportion of the cottages are occupied.

We have made arrangements so that when the inspection is made, Prof. Robert Fletcher, civil engineer of the board, will be present to study the conditions from an engineer's point of view. In the meantime will you please inform us who are the directors of the campmeeting grounds, particularly the officers of the association?

Very truly yours,

IRVING A. WATSON,
Secretary.

The condition of affairs, so far as the pollution of the water supply was concerned, had not been brought to the attention of the management of the Boston & Maine Railroad, and plans were under way for the extension of the sewer campground system. The superintendent was informed by the local board of health that the State Board of Health would require a change and that it would not permit the construction of new sewers for the extension of the existing system, but would, in all probability, take action to prevent any sewering into the lake. Upon this information the superintendent of that division suspended the proposed operations, with the statement that he did not desire to do anything that would jeopardize public health interests, and was willing to await the action of the State Board of Health in the matter.

Arrangements were made for Prof. Robert Fletcher, civil engineer of the board, and the secretary to make an inspection of the locality July 6, and notice to that effect was sent to the superintendent of that division of the Boston & Maine Railroad, asking him to be present; but a prior engagement prevented his accepting the invitation.

The result of the inspection is presented in the following letters:

CONCORD, N. H., July 25, 1905.

William Merritt, Supt. B. & M. R. R., Western Division, Boston, Mass.

DEAR SIR: We desire to call your attention to some matters connected with the condition of the waters of Alton Bay, and to say that such legal procedure has been complied with on the part of many of the residents of Alton as to necessitate official action under the statutes by the State Board of Health to protect, as far as possible, this bay from dangerous pollution.

The authority conferred upon this board is under chapter 57, N. H. Laws of 1899.

Recently, with Robert Fletcher, C. E., civil engineer to this board, we made a careful inspection of the conditions pertaining to the bay and its surroundings, and I transmit herewith a copy of Mr. Fletcher's communication to me on the subject, which embodies substantially a description of conditions there existing, together with some conclusions in the matter.

At the last session of the Legislature a special act was passed, providing for the exclusion of manufacturing waste, etc., from the river emptying into the bay named. It was desired at that time by some of the legislators to extend the provisions of the bill so far as to exclude all such waste and sewage from the lake. I mention this to show that it is the trend of legislation to exclude sewage from this lake, and it is the entertained belief of many who have studied the subject that the day is not far distant when all sewage will be so excluded from these waters. This will be done, not only in the interests of public health, but also for the advancement of summer-resort interests. I may say that we have been urged by many summer residents, some of them representing considerable property and expending large sums in this state, to prohibit the discharge of sewage into Lake Winnepesaukee. But this broad question is not now under consideration.

The fact that a water system has been established at Alton Bay, from which is pumped water at frequent intervals, makes it necessary that prompt action shall be taken. That the water takers and the riparian owners have a right to the water in an uncontaminated condition, or, in other words, in its native purity, has been established by the courts, and therefore they have the right to ask and to insist that contaminations shall be excluded.

So far as this board is concerned, we desire to act with strict impartiality, and have looked the ground over with a view to seeing how the matter can best be taken care of in a legal and proper manner. We believe that the brief recommendations of Professor Fletcher, that a settling tank with proper filtration (which would not be expensive and would require but little space), located substantially at a point mentioned by him, would constitute a satisfactory system for the campground; that it could be installed without large expense, and that it would remove the danger now existing, so far as the campground is concerned. The latter and the railway station are sources of contamination which, I suppose, are within your power to remedy, and we would respectfully ask you to look over the matter and give it your careful consideration as early as may be, and if, in any of the changes proposed, this board can be of any service to you, by way of recommendations, plans, etc., we shall be very glad so to do.

So far as pollution of the bay from other sources is concerned, we are able to take care of that entirely.

We submit this whole matter for your careful consideration.

Very truly yours,

(Signed) IRVING A. WATSON,

Secretary.

Inclosure.

HANOVER, N. H., July 10, 1905.

Dr. Irving A. Watson, Secretary State Board of Health.

DEAR SIR: Concerning our joint inspection of the situation at Alton Bay, on the 6th, and the conditions as viewed by a civil and sanitary engineer, I am led to the following statements and suggestions based upon very plain facts:

First—*The Situation*,—at the head of the narrow bay:

1. A railroad station and steamboat landing; hundreds coming and going daily in the season; the steamboat with *privies* in free use on the lake and possibly near the wharf; at the wharf a *station privy* just over the lake margin, where the droppings are washed away by the waves.

2. Just westerly of this, on high rising land (sandy and gravelly soil), an "encampment" of several hundred cottages and shanties, built close together on narrow, winding lanes or streets; *privies* freely distributed amidst this mass of buildings; a rather scant water-supply of doubtful quality, judging by the small artificial pool nearby; some of the cottages on a low narrow tongue of land separating a shallow back bay from the lake; two sewer outlets (iron pipe) into the lake and one into the back bay; a proposition to extend the (a) sewer system through the "camp" resisted by the local board of health.

3. A number of well-built summer cottages and one considerable hotel on or near the lake margin on east side of the bay; several sewer outlets from these near water level.

4. The *intake* near pumping station of the Alton water works on the east side less than 600 feet (perhaps 500) of the boat-landing and station privy. Depth of water near landing (soundings made that day) about six feet; midway to intake about seventeen feet. No perceptible current from the small stream through Alton discharging at head of bay.

5. The village of Alton extending a mile or more back from the bay; a small water works system, but no sewer system. Some houses and outbuildings too near the sluggish stream (or inset from the lake).

Second—*Consequences*. *Certainty* of the pollution of the waters of the lake (naturally among the purest in the world); *probability* of infection from dejecta of diseased persons; *possibility* of an outbreak of typhoid fever or other water-borne disease (at every landing the steamers stir the water so as to wash out the droppings of the privy and create some movement of all the water in the narrow bay).

Third—*Conclusion*. Given the *proposition* that the native purity of the lake water must be maintained, and the discharge into it of any untreated sewage prohibited, the following remedial measures are suggested as best adapted, on score of least cost and avoidance of complication.

A. On the steamboat the installation of the dry-earth system, similar to that suggested for Lake Sunapee and used there, as I understand. Boxes should be not too large to be easily handled by two men, possibly using rollers, and therefore should be emptied daily into a well-kept pit at least 100 feet from lake margin. The station privy may be managed in the same way, unless the company prefers to use "water" closets of approved type in connection with the next suggestion.

B. At the "encampment" the season is so short that small works only are needed. *If* water enough is used to give good flow of sewage a simple *tight* cemented tank, on the septic principle (allowing continuous flow through it)

may be located in the space northwest of the roundhouse, high enough to allow the effluent to flow alternately on the filter beds between it and the lake. Suggested size, four feet wide and deep, and twelve feet or more long; but the details must be left to their consulting engineer. This shore space is so low that the bottom of the tank may have to be set up a little, so that the filter areas (in the natural sand there) may be able to pass the effluent. This should be covered with a tight board house high enough for a man to enter. It will be more difficult to provide for the houses on the lower point; but the engineer could probably accomplish it. In a word a diminutive septic tank is proposed, the effluent from which *might* be distributed at various points in the sand deposit and allowed to filter away under the assumption of proper filtration before reaching the lake.

C. The east side must be required to discontinue all sewage discharge, and adopt either the dry earth system or septic tank treatment, as their circumstances may permit.

D. Supposing these or other effective measures to be taken, the local board of health must exercise continuing vigilance to see that right conditions are *maintained;* "there 's the rub."

Yours truly,
(Signed) ROBERT FLETCHER,
Member of the Board.

To carry out the changes recommended, or, rather, to provide a way to exclude all sewage from the lake, meant a careful survey by competent engineers of the entire territory, and the expenditure of considerable money to accomplish the object. This necessarily delayed the work. The condition of the water was dangerous to the water takers. The following letter was, therefore, addressed to the board of health of Alton:

CONCORD, N. H., August 15, 1906.

Board of Health, Alton, N. H.

GENTLEMEN: Between July 25 and August 8, 1905, we have made three complete chemical examinations of samples of water taken from your supply. One from directly over the intake and the other two from taps in the water system, and have also made seven bacteriological examinations between dates named. We find that the water is not constant in its quality and is undergoing some pollution. We find that every examination, except the first one examined July 24, contains the colon bacillus, which is an indication that the water is being polluted to some extent, either from the railroad station or the campmeeting grounds or both. The situation is such as to be a constant menace to the health of every water taker, and we would respectfully request your board to notify (preferably with a printed notice) the occupants of every house supplied by this water that it is unsafe to use for drinking purposes until it has been boiled.

Very truly yours,
(Signed) IRVING A. WATSON,
Secretary.

Prompt action was taken, as will be seen by the following:

ALTON, N. H., August 17, 1905.

Irving A. Watson, M. D., Secretary State Board of Health.

DEAR SIR: Yours received, and instructions followed. Will inclose sample of notice which we have left at every house where water is received. Have also put the public tap fountain on the Square out of commission, and we cheerfully await your pleasure.

Respectfully,
(Signed) C. E. HUTCHINS.

NOTICE.

By direction of the State Board of Health we wish to notify the water takers of the Alton and Alton Bay Water Co. that the water has been examined, and found unsafe to be use for drinking purposes until it has been boiled.

C. E. FIFIELD,
C. E. HUTCHINS,
F. M. AYERS,
Board of Health.

ALTON, N. H., August 15, 1905.

It was apparent that the proper surveys and final arrangements could not be made in season to complete the work before the opening of another season. Frequent examinations of the water were therefore made by the State Board of Health, to determine to what extent the condition was improving after the close of the summer season. By the first of November the colon bacillus disappeared, and on November 21 the board of health of Alton was informed that the water takers might be notified that it was no longer necessary to boil the water before using it for drinking purposes.

Here the matter rested for several months, until early in the season of 1906. Prof. Robert Fletcher, civil engineer of the board, and the secretary were invited to meet Mr. H. Bissell, chief engineer of the Boston & Maine Railroad, for the purpose of looking over plans which had been made for the disposal of the sewage at the campground at Alton Bay. These plans provided for a complete sewer system for the entire grounds, with terminals at various points, in the gravelly sub-soil some distance back from the lake, so that only the filtered affluent would reach the bay. These plans were most complete in every detail, and were unanimously approved. When the estimates of the cost of construction were presented to the general management of the road, it was deemed to be excessive, or, rather, that the plans called for a far greater outlay than it was deemed expedient to put into the work.

A new set of plans, considerably modified, was then drafted; but these, also, met with the same objection. Subsequently another survey, with new and still further modified plan, was made, which was accepted with

the contingent approval on the part of the secretary of the State Board of Health, in that if in operation it was successful, then it would meet all the requirements of the board. The board was interested only in securing the exclusion of sewage from the lake, and would be satisfied with any plan that would accomplish this object. A system was then promptly constructed by the Boston & Maine Railroad which intercepted or cut off all the then existing sewers, and established such new ones as seemed to be absolutely necessary, with terminals in the gravelly sub-soil, as was presented in all the plans under consideration.

The small covered cesspools, which were constructed at the terminals of the sewers, proved to be, almost from the first trial, too small to take care of the amount of water that was being delivered, and to obviate this difficulty, radiating pipes, with loose joints, were laid from the cesspools in different directions in the gravel, somewhat similar to the manner in which the spokes of a wheel radiate from its hub. We understand that this method has proven perfectly satisfactory and has taken care of all the sewage during the past season.

The closets which formerly existed at the railway station have been supplanted by a new system, which sewers into a cesspool something like one hundred feet back from the lake.

In the mean time, while this work was going on, the owners of cottages and buildings along the river and the shores of the lake were notified of the requirements that would probably be adopted by the State Board of Health in establishing regulations to prevent the contamination of the waters of the bay. Early in July, 1906, such changes had been made as to warrant the State Board of Health in establishing the regulations asked for, which were adopted and promulgated as follows:

THE STATE OF NEW HAMPSHIRE.

Whereas, a legal petition has been presented to the State Board of Health, asking for the establishment of regulations to protect the public water supply of the village of Alton, under the provisions of chapter 57, Laws of 1899, entitled "An Act for the Protection of Public Water Supplies," the following regulations are promulgated:

REGULATIONS OF THE STATE BOARD OF HEALTH
FOR THE
PROTECTION OF THE PURITY OF THE PUBLIC WATER
SUPPLY OF ALTON VILLAGE.

1. No privy, and no pig-pen, stable, or other building or structure in which horses, cattle, swine, or other animals, or fowls are kept, shall be built or maintained within seventy-five feet of Alton Bay (meaning high-water mark), or

within seventy-five feet of any cove, or inlet thereto, or within seventy-five feet of any stream tributary to said bay, coves, or inlets, except in such cases as the local board of health may permit, upon the approval of the State Board of Health, and under such regulations as they may require.

2. No sink-water, urine, or water that has been used for washing or cleansing either materials, person or food, shall be allowed to run into said bay, or into any cove, or inlet thereof, or into any stream tributary thereto, or into any excavation or cesspool in the ground, or on the surface of any ground within seventy-five feet of said bay (meaning high-water mark), or of any cove, or inlet, or within seventy-five feet of any stream tributary thereto, except by consent and under such regulations and conditions as may be given by the local board of health, upon approval of the State Board of Health.

3. No dead animal, or fish, or parts thereof, or food, or any article perishable or decayable, and no dung, either human or animal, kitchen waste, swill, or garbage, shall be thrown into or deposited in said bay, or left or permitted to remain within seventy-five feet thereof (meaning high-water mark), or into any cove, or inlet of said bay, or into any stream tributary thereto, or within seventy-five feet of such cove, or inlet, stream or tributary.

4. No sawdust shall be thrown or be allowed to fall into said bay, or into any stream tributary thereto.

5. No person shall bathe, swim or wade in said bay, or in any stream tributary thereto.

6. No boat either for public or private use, nor houseboat, nor other construction for use on said bay shall have, keep, or maintain a ship-closet, urinal, or other construction of easement which shall permit excrement or other offal to fall or empty into said bay.

7. No matter, waste, or materials such as are described in sections 2, 3 and 4, shall be thrown, deposited, or allowed to remain upon the ice of the waters of said bay, or upon that of any cove, or inlet thereof, or of any stream tributary thereto.

8. The local board of health is directed to make occasional inspections of the watershed of the bay, and to prohibit the maintenance of any nuisance thereon that might pollute the waters of said bay.

9. The westerly limit of the application of these regulations, for the protection of the purity of the waters of Alton Bay, is bounded by a straight line from the most extreme portion of Sandy Point, so called, projecting into the bay, to the westerly side of Kelly's boat-house, so called, on the opposite shore.

10. It is the duty of the local board of health to enforce these regulations, and any person violating the same will be liable to a fine of twenty dollars for each offense. (Section 2, chapter 57, Laws of 1899.)

11. All the foregoing regulations will take effect and be in force on and after August 1, 1906.

Any deviation from the above regulations must be by recommendation of the local board of health, with the consent of the State Board of Health.

I hereby certify that the foregoing rules and regulations were adopted at a regular meeting of the State Board of Health held at the state house, Concord, this seventeenth day of July, 1906.

IRVING A. WATSON,
Secretary.

Alton Bay was in part protected from pollution by direct legislative action in 1905, as follows:

CHAPTER 12, LAWS OF 1905.

An Act to Protect the Waters of Alton Bay from Pollution by Sawdust and Other Waste.

SECTION 1. That no sawdust, shavings, or other waste products of sawmills, planing mills, or other manufactories shall be deposited, dumped, or placed in that part of Lade Winnepesaukee known as Alton Bay, nor shall any sawdust, shavings, or other waste products be allowed to escape into, or be deposited, dumped, or placed in any stream which runs, or empties, into said bay.

SECT. 2. Any person, or any officer of any corporation, violating the provisions of this act shall be fined not exceeding twenty-five dollars for each offense, and each day of a violation of the same shall be deemed a separate offense.

SECT. 3. All acts and parts of acts inconsistent with this act are hereby repealed.

SECT. 4. This act shall take effect April 1, 1905.

[Approved February 9, 1905.]

TYPHOID FEVER AND THE WATER SUPPLY OF BERLIN.

April 20, 1906, the State Board of Health was first informed of an outbreak of typhoid fever at Berlin by the following communication:

BERLIN, N. H., April 19, 1906.

State Board of Health.

GENTLEMEN: You will receive by express one box containing water taken from different aqueducts in the city of Berlin, and also one sample of milk, which you will analyze to see if any typhoid germs are present in the water and milk. We have at present in the city over forty cases of typhoid fever. You will please give me a report upon the different samples at your earliest convenience.

Yours fraternally,

(Signed) A. PROVOST, M. D.,

Chairman Board of Health.

It appeared that the chairman of the local board of health, while reporting scarlet fever and diphtheria regularly, did not understand that typhoid fever should also be reported to the State Board of Health; hence the reason why no early information was received by the latter board.

Immediately upon the receipt of the above letter, the State Board of Health employed Dr. H. N. Kingsford, one of its bacteriologists, to go to Berlin to investigate the situation. Dr. Kingsford spent several days there, examined all the sources of water supply, and went over the whole matter with great care.

In the meantime numerous analyses of water taken from the various sources at Berlin were made at the State Laboratory of Hygiene, and reports were rendered upon the same. (See page 17.)

The substance of Dr. Kingsford's report was transmitted to the proper authorities in the following letter:

CONCORD, N. H., April 30, 1906.

A. J. Provost, M. D., Chairman Board of Health, Berlin, N. H.

DEAR DOCTOR: We are in possession of a complete report of the investigation made by Dr. Kingsford, at the request of this board, of the conditions relating to the water supply of your city. We have also in our laboratory a record of the chemical and bacteriological examinations of water from the various springs and other sources that constitute the supply of your city. Some of the facts in connection therewith have already been transmitted to you, I take it, through Dr.

Kingsford, or you have acted upon his recommendations, or the combined judgment of both of you in closing certain sources of supply.

I note the order promulgated by Mayor Hutchins, as published in one of your papers, and am pleased to know that he has taken such prompt action in an earnest endeavor to protect the public health of the city.

I am unable to identify positively all the sources named in connection with the the samples of water examined at the State Laboratory of Hygiene, and will therefore quote Dr. Kingsford's recommendation on this point. He says:

"I would insist that the water from the Brown and Main Street Spring, Cold Spring, Demar's Reservoir, Stahl Reservoir, and the spring beside the road at Berlin Mills be cut off and be closed up for good, as there are too many houses on the shed to be safe, whatever is done in the way of cleaning. Also that Spring No. 6 on Green system be closed for good; that the other springs on this system be cleansed, covers removed from reservoirs, graded, fenced, and notices posted asking the people to respect them. Also that new covers be placed on the small springs, and that they be graded and fenced. I recommend that the same be done with the Forbush system. The Ramsey reservoir and the Kelley spring should be cut out. Under no circumstances should the river water be used for drinking purposes."

Dr. Kingsford further summarizes the work done at the laboratory, and in connection with his observation says:

"The following specimens have been examined for evidences of pollution:

"Green Spring No. 1 shows no evidence of pollution.

"Green Spring No. 2. (See report of chemical analysis No. 3572.)

"Green Spring No. 3 shows no evidence of pollution.

"Green Spring No. 4 shows no evidence of pollution.

"Green Spring No. 5 shows no evidence of pollution.

"Green Spring No. 6 shows evidence of pollution, but no colon are found. This spring is quite near two houses which drain into it, and should be cut out. I think the spring is already cut off.

"All of the Green system of springs is situated on a hillside and there are no houses on the watershed except No. 5. They need cleaning out very badly, and the large reservoir should have the covers and all woodwork removed, the ground around them graded, and a suitable fence built around them. The smaller springs need new covers and grading around.

"Ramsey Reservoir shows marked evidence of pollution and also shows colon bacilli. There are a number of houses on the watershed of the reservoir, and considerable surface drainage gets into the water. In my opinion it will be impossible to make them a good supply.

"Kelley Spring is markedly polluted and shows colon bacilli. This is a private spring and many people are using the water. The spring is back of a house. There are a number of buildings on the watershed and much surface drainage finds its way into the spring.

"Forbush Aqueduct, East Side, shows considerable material in suspension and many bacteria, but no evidence of pollution. This needs cleaning up and grading and fencing around it.

"Reservoir Horn Brook, East Branch, shows no evidence of contamination.

"Reservoir Horn Brook, Main Branch, shows no evidence of contamination.

"Stewart's Reservoir, on Horn Brook, shows no evidence of contamination.

"Milk, collected from F. H. Farwell, Berlin House, furnished by Gagnon shows no evidence of pollution.

"Milk, from Morrill's Bakery, furnished by Gagnon, shows no evidence of pollution.

"Milk, from Connor's Bakery, furnished by Brooks, shows no evidence of pollution.

"Milk, from Gerrish Bros., Pasteurized, shows no evidence of pollution.

"Practically all the milk furnished Berlin comes from Brooks, and he gets his milk from over the main line. It comes on the cars and is bottled by him.

"Oysters: One sample was all that it was possible to obtain, and that was from City Fish Market, from Norfolk, Virginia, shows no evidence of pollution."

I would make one more suggestion, to wit, that if practicable the water pipes should be flushed, so as to relieve them of any mixed waters that they may now contain.

The public recommendation to boil all water before using for drinking purposes is fully endorsed, but we have found that such a suggestion is never heeded by all the persons in a community, and therefore, in addition to the closing of all sources known to be polluted orsus pected of being, the flushing of the pipes, as suggested, might be advisable.

We are ready at all times to coöperate with your board or with the corporations furnishing the water supplies, to the end that the public health may be safeguarded against another outbreak of like character.

Very truly yours,

(Signed) IRVING A. WATSON,

Secretary.

The prompt action of Mayor Hutchins, in issuing a proclamation, and of the local board of health, in closing all the polluted sources of water supply, was most commendable and doubtless prevented a much greater epidemic than would probably otherwise have resulted.

It is understood that the sources of water supply believed to be dangerous have been permanently closed.

Dr. A. Provost, chairman of the local board of health, states that there was a total of ninety-six cases of typhoid fever reported to the board in this outbreak.

DOVER WATER WORKS.

On pages 31 and 32 of this report will be found a record of considerable laboratory work in connection with the water supply of the City of Dover. Certain conditions arose that required investigating, and these are particularly well shown up in the report of Mr. C. D. Howard, chemist of this board, after an examination of the situation. His communications to the board of water commissioners are herewith given:

CONCORD, N. H., June 18, 1906.

The Board of Water Commissioners, Dover, N. H.

GENTLEMEN: I beg to submit the following report and recommendations as the result of my inspection of the Dover water supply, June 16, 1906:

SOURCES OF SUPPLY.

It appears that at the present time the supply is derived from two sources, (a) a pond of about seventy-five acres, fed by springs, located two miles north of the city, and (b) a series of springs situated somewhat less than a mile from the pond and in an easterly direction therefrom. The latter were added to the system during the past year, the water from this source now constituting about ninety per cent. of the total daily pumpage of 800,000 gallons.

SPRINGS SUPPLY.

These springs are located in a partially wooded tract of low-lying ground extending along the base of an open hillside of about thirty degrees slope and at an approximate distance of fifty rods from the crest of the latter. The surface of this tract is covered with from one to three feet of muck, underlaid by a stratum consisting of a mixture of sand and clay. The water, issuing from the sand stratum at points in the base of the slope, is carried by a group of a half dozen lateral drains for a distance of twenty-five to seventy-five yards to a series of catch-basins. or wells of about eight feet depth, and located on a main that serves to convey the accumulated water to the pump well at one end of the system. Both the main and the laterals are sunken in the sand several feet below the muck and are laid with open joints. The water in all the catch-basins was notably clear and attractive in appearance; that from several, however, exhibited a notably astringent taste, due to iron in solution.

QUALITY OF SPRING WATER.

Analyses made of these waters during the past few months have not been wholly satisfactory. Total solids and hardness are approximately double that for the pond water, free and albuminoid ammonia tend to be excessive, while the chlorine content is much higher than the local normal. The samples as received at the laboratory have all shown considerable iron sediment.

In view of the fact that the watershed is uninhabited, explanation of the high chlorine content of these waters is somewhat difficult. Before being purchased

by the city this tract was formerly ranged by cattle to a greater or less extent, and it is true that at the present moment the upper half of the slope serves as pasturage. This fact, however, would seem scarcely sufficient to explain the analytical features, and a plausible theory is that at some earlier geological period this locality may have been penetrated by tide water.

The present content of dissolved organic matter is plainly referable to the nature of the surface stratum. More or less of this muck was unavoidably mingled with the sand during the laying of the mains, and as the latter were laid with open joints, for the purpose of collecting all the water possible, entrance of some of the dissolved constituents is at present inevitable. However, this feature is not seriously objectionable, and while the water will probably always show a certain amount of organic matter, the present excess will, of course, disappear in time.

IRON CONTENT.

The unfortunate feature of the springs supply is its content of dissolved iron. The exposed soil at a number of places shows streaks of a highly ferruginous sand, which in spots approximates fairly rich hematite. The latter has apparently undergone considerable solution by the water, that at the greater number of the wells showing, as already mentioned, a distinctly astringent taste. While not seriously objectionable from a hygienic standpoint, the presence of iron greatly injures a supply for general household and industrial uses, and the employment of some process for its removal is always absolutely necessary. As yet, no estimate has been made of the quantity in solution or of the form in which it occurs, and until this is done it will be impracticable to recommend any treatment. The latter, in general, consists of some process of aeration, usually with subsequent rapid filtration through a sand bed for removing the precipitated iron.

To effect aeration the water may be allowed to traverse an open canal in a shallow stream, or be allowed to fall from a height in a fine shower by traversing a series of perforated plates. Sometimes simple subsidence exposed to the air for a period proves fairly effective. A method employed to some extent in recent years consists in forcing the water through a scrubber filled with blast-furnace coke, the latter serving to retain most of the iron. From the fact that the presence of iron in the supply has thus far not evoked any considerable complaint, and is said to be not at all noticeable at times, or at certain points, it is apparent that the quantity dissolved is not great, and it is probably in such form as to be removable at comparatively little expense. A point that should be understood in this connection is that a water of this nature is an ideal medium for the propagation of microscopic plants or fungi known as *Crenothrix*. The latter tend to cover the interior walls of the mains with a fibrous, iron-colored "pipe-moss," that not only partially clogs the system in time, but whose decomposition imparts a more or less disagreeable odor to the water. Exposure to light and air is fatal to the growth of these plants.

RECOMMENDATION.

In my judgment, for the purpose of the exclusion of cattle, the purchase or control by the city of all the land extending to the crest of the slope above the springs is absolutely essential to the future maintenance of an uncontaminated supply.

POND SUPPLY.

While this supply has in the past been of satisfactory quality, in view of the present tendency to encroachment upon its shores especial vigilance on the part of the board will be necessary in the future to protect this body of water from contaminating influences. At present the pond is exposed to three possible sources of pollution. Doubtless the least of these is from the stables of the Granite State Driving Park, located on or close to the northern shore. However, at the present, apparently no drainage from this source enters the pond.

On the eastern shore, and within the town of Somersworth, an extensive picnic ground is located. It is represented that the latter is well policed during the summer season and that no drainage from this point is allowed to enter the pond. However, it is admitted that the patronage of this resort is rapidly increasing with every year, and the necessity for the strictest police inspection at this point is therefore obvious.

On the west shore a most unfortunate feature is to be found in the beginnings of a proposed suburban "addition." Several acres of nearly level land, extending from the Rochester highway to the extreme edge of the bluff above the surface of the water are plentifully besprinkled with lot stakes, and it is evidently the intention of the promoters to establish as early as may be a comparatively thickly settled community upon this shore of the pond. At the present there are two houses located at the extreme edge of the bluff. Arrangements are being made by the health officer to have these houses provided with drawer earth closets, and the application of manure to the soil for gardening purposes will in the future be forbidden. However, if present plans are carried out, this shore of the pond will become a particular source of danger, so that it may ultimately become necessary for your board to petition the State Board of Health for the issuance of special regulations for the protection of this supply.

ACID CONDITION OBSERVED.

During the past month an abnormal condition of the water has been noted by two or three users located near the extreme end of the supply system, the complaint being that the water, after passing through the ordinary form of domestic tank heater, gave a bluish-green color with soap. This phenomenon is attributable to the presence of dissolved copper, and investigation promptly revealed the fact that the water in the house main possessed a slight acidity. In my inspection this condition was tested for at all points on the supply system and also at certain places in the center of the city, the results in all cases, however, indicating a normal alkalinity. This condition is therefore local in nature, a plausible explanation being that such is due to a deposit of muck at some point in the system, washed in during the construction at the springs, and now gradually decomposing with a production of humic acid. Doubtless a thorough blowing out at the fire plugs nearest these residences will be sufficient to remove this condition.

Respectfully submitted,

(Signed) C. D. HOWARD,
Chemist, State Board of Health.

CONCORD, N. H., June 18, 1906.

Mr. H. E. Perry, Superintendent Dover Water Works, Dover, N. H.

DEAR SIR: I have just transmitted to the board of water commissioners my report of inspection on Saturday.

I believe it would be well during the next few days (after settled conditions) to have further analyses made of samples of the spring water taken from one or two points on the lateral mains, from the receiving well at the spring pump house, from the runway at the central receiving basin, and also from a spigot in the city, these analyses more especially for the purpose of estimating the relative amounts of iron, the quantity removed in transit, and also the form of combination. I am, therefore, sending you today a half dozen containers, and would suggest that these samples should all be taken at about the same time.

I am sorry, but am afraid you will find it ultimately necessary to adopt some scheme for the removal of the iron. In some localities this has proved rather a serious matter, but I am inclined to believe that in this case some simple and inexpensive process can be devised that will prove effective.

Very truly yours,
(Signed) C. D. HOWARD,
Chemist.

CONCORD, N. H., June 27, 1906.

Mr. H. E. Perry, Superintendent Water Works, Dover, N. H.

DEAR SIR: Analyses of samples from wells No. 5 and 6, and also from Cate Spring House, May 8, indicate a good and satisfactory quality of water. However, the samples from No. 3 and No. 4, and also May 8 from No. 1 and No. 2, do not show up well. Iron is present in considerable quantity in all cases, and in addition, in my mind, there is no question but that these wells are receiving drainage from the pasture above. It is true that filtration of drainage from this source is fairly good at present, and while the actual danger from such source to users of water may not be very serious, still it is an objectionable condition of affairs and one that the city should take steps to remedy at once.

No. 1, No. 2, No. 3 and No. 4 not only all showed an iron sediment on reaching the laboratory, but I then found them slightly acid, though you will recall that that condition was not noted in the *fresh* waters at any point, but only in some semi-stagnant surface water lying in the muck. It is quite evident that the organic matter from the muck has a tendency to decompose, *as the water stands*, with a production of humic acid, such as was noticed at Mr. Sawyer's. Thus I did not notice this condition in a sample I tested at the American House, and it may not have existed in the freshly-drawn water at Coleman's stable, but it was certainly apparent in the sample the next day. In this respect and in content of iron you will note that No. 3 appears the worst, although No. 4 is very similar. In the spring pump-house sample there was just enough water from No. 5 and No. 6 to keep the whole volume neutral, but further on, at the receiving basin, more decomposition has occurred, with the production of more acidity. Both iron and tendency to acidity have disappeared somewhat in the stable sample, probably from storage, exposed to the air at the reservoir and mixture with the pond water.

The tendency to acidity on standing may disappear before long, but there is no probability of the iron doing so, so that if you continue to use water from the wells indicated, it will ultimately become necessary—by storage or aeration and possibly filtration through sand—to memove this metal.

Very truly yours,
(Signed) C. D. HOWARD,
Chemist.

THE FRANKLIN WATER SUPPLY.

A statement of part of the analytical work done in connection with the public water supply of the City of Franklin may be found on page 38 of this report.

It was thought advisable to make a careful inspection of the locality for the purpose of better understanding the conditions, and to be better qualified to give advice if called upon. To that end Mr. C. D. Howard, chemist of the board, made the examination, and reported as follows:

Dr. Irving A. Watson, Secretary State Board of Health.

DEAR SIR: Concerning an inspection made by me October 11, 1906, of the water supply system of Franklin, I would report as fallows:

This supply is at present derived from three sources, viz., springs, tubular and driven wells, and the Pemigewasset River.

The springs supply, which ordinarily constitutes about one half of the total consumption, consists of ground water issuing at various points from a partially wooded hillside about one-third mile southeast from Franklin Falls. Of this series, the Coldbrook Springs, four in number, furnish the greater part of this water. The next group in importance includes the Elkins' Springs, so called, five in number, located a few rods from the first named but draining a different portion of the watershed. A third group, known as the Sanborn Springs, numbering ten or twelve, now constitutes but an insignificant portion of the supply. The water supplying these springs (which, in all cases, are bricked up and covered) issues for the most part from sand and gravel and is apparently in no wise subject to any contaminating influences.

The second division of the supply consists of a series of tubular and driven wells sunken near the east bank of the Pemigewasset River a short distance above the town. Beginning at the most northerly, this system includes the "Five Foot" well, and wells "A," "B," "C," "D," "E" and "F," all of the tubular class, constructed of brick and cement to a depth of about twenty-five feet from the surface and then extended by six-inch pipe to a further depth of thirty feet. The water of most of these wells apparently stands at a higher level than that of the river surface, and undoubtedly is drawn from the hill east of the river.

In addition to the tubular wells, there are also located in the immediate vicinity four driven wells ranging in depth from twenty-four to thirty-five feet, and known respectively as the North, South, East and West wells. The latter do not supply a very large volume of water.

Mention should perhaps also be made of a former source of supply known as the "Sulphite Spring." This spring, located near the river bank, was formerly much resorted to and was for a time utilized by the city as an auxiliary supply. However, the water has never given a favorable analysis and, it is represented, has not formed any part of the city supply since December, 1905.

Under favorable seasonal conditions, the two sources mentioned furnish a fairly adequate supply. However, during periods of drowth it has been necessary to supplement this supply to a greater or less extent by direct pumping from the Pemigewasset River. The latter source I find being thus resorted to at the date of this report. Concerning the quality of the river water, while the chemical analyses are not unfavorable, yet past bacteriological examinations have uniformly demonstrated the presence of colon bacilli, and the water commissioners therefore represent that it is now their custom to notify patrons whenever such use becomes necessary, and to advise boiling as a precautionary measure.

To just what extent the Pemigewasset River is subject to pollution above the point of intake, I have not yet ascertained by any personal inspection. The more probable sources of pollution, in the order of their remoteness are the towns of Hill, eight miles, Bristol, thirteen miles, Ashland, twenty miles, and Plymouth, twenty-four miles above. Much of the intervening territory consists of woodland and pasturage and it would seem there might be some ground for arguing that the presence of colon bacilli in the river water may in some measure at least, be due merely to pasture wash.

However, I find at the present time measures are being taken to increase the ground water supply through the collection of the apparently rather considerable volume of water that issues from the base of the hillside north of the series of tubular wells. A level "springy" area of two or three acres extent, lying between the hill and the river, has been denuded of trees and undergrowth and an overlaying deposit of muck is now being removed from a certain portion of the area with a view to collecting the water in the gravel substratum and conducting it to a series of catch-basins. It is hoped that by this means the supply may be sufficiently augmented so that future recourse to river water will not be found necessary.

Respectfully submitted,

(Signed) C. D. HOWARD,
Chemist.

THE LEBANON WATER SUPPLY.

We would call attention to the fact that two years ago, in the Report of the State Board of Health, a special report was made upon the water supply of Lebanon, showing that at times it was dangerously contaminated. Efforts have been made to remedy the condition, but without any marked degree of success.

The Report of the Water Commissioners and Superintendent for the year ending April 1, 1905, says:

During the low water season in September last, complaint was made in regard to the quality of our water supply and upon investigation indication of sewage was found and traced to the river above the pumping station showing it contaminated, containing colon bacilli. Our present filter system did good service but for a time this failed to remove the bacilli, which the State Board of Health claimed no mechanical filter would do. We then began considering when and how we could get a supply that would be satisfactory and safe from pollution and at the same time at a reasonable expense. It was finally decided, as an experiment, to put in a deep well near the pumping station to a depth of 300 feet. This has been done by the Artesian Well & Supply Co. of Providence, R. I., at a cost of $3.50 per foot, with quite satisfactory results and the indications are that a full supply may be obtained in this manner at a less cost and safer from contamination than any other source. The estimated cost of the system completed would be under $8,000.

All of the sources of supply, exclusive of the river, have proven insufficient for the demands of the town, so that, as heretofore, a part of the water used has come, directly or indirectly, from Mascoma River. Numerous analyses and bacteriological examinations have been made at the State Laboratory of Hygiene, and colon bacilli were found to be present during the autumn months.

For the purpose of ascertaining more in detail the exact conditions which existed, the board sent its chemist to make a local inspection. Following is his report:

STATE LABORATORY OF HYGIENE.

SEPTEMBER 6, 1906.

Dr. Irving A. Watson, State Board of Health, City.

DEAR SIR: I desire to report as follows concerning an inspection made by me September 5, 1906, of the Lebanon water supply system:

The source of supply is essentially as described on page 143 of the Report for 1903–'04. The pumping station is located on a flat, oval-shaped tract of several

acres extent, bounded on one side by the Mascoma River and on the other by a canal leading from the river and formerly employed to feed the pumps as well as supply power for their operation. From near the upper junction of the river and canal a channel or trench ten feet wide extends about 100 feet towards the centre of the tract. The area between this trench and the canal has been thickly laid with loose-jointed drain tile. The filter-well, supplied by the tile and by infiltration from the trench, is located near the southwestern extremity of the latter and is connected by main with a covered storage or pump well 63 x 30 x 15 feet.

In addition to the filtered supply, in 1904 an artesian well was sunk near the pump well, a large vein of water having been encountered at a depth of 290 feet. This well, the water of which is raised by compressed air, is materially harder than the river supply and now constitutes about one half of the total available pumpage.

A question arises as to the continued efficiency of the filtration process taking place in the soil stratum between the trench and the filter well. It is represented that the bottom and walls of this trench are thoroughly scraped twice yearly, that there is no evidence, by increase of flow or otherwise, of channeling, and that in general an arrangement of this nature should compare favorably in its action with that of the ordinary type of slow sand filter.

However, the latter can scarcely be accepted, as several important essentials embodied in the sand filter are lacking in the process under consideration. Tests to determine the bacterial efficiency of this filter will be made at once.

I find a portion of the land in front of the pumping station and lying between the filter and storage wells is devoted to a garden, it being the practice to apply two or three loads of stable manure annually thereon. While it would scarcely seem probable that there is much opportunity for pollution from this source, still, as a precautionary measure I would advise that the use of manure upon this tract be dispensed with in the future.

During the past season there has been some complaint on the part of water users with regard to odor, it being claimed that this is very marked at times, especially in water as freshly drawn from the tap. This odor was also said to be noticeable, though in lesser degree during the summer of 1905. At the reservoir some odor was noticeable ; examination of the bottom and walls showed it to be covered with a thin greenish gelatinous film. I was informed that the reservoir was cleaned one year ago for the first time and that the amount of material then removed was very slight,—less, in fact, than had since formed during the past year. It also appears that before the addition of the harder artesian water to the supply there was no trouble from odors. Microscopical examination of some of the gelatinous growth, transported to the laboratory, showed it to be very rich in vegetable organisms mainly of the diatomaceæ order,—including navicula viridis, tabillaria flocculosa, melosira, synedra pulchella, fragillaria ; also some spirogyra, vulvox, chroococcus, with some forms of protozoa and several specimens of canthocamptus crustaceæ. No asterionella were observed and as yet the supply gives no evidence or suspicion of containing crenothrix.

It is evident that the exposure to sunlight of the deep well water in the open reservoir is responsible for the growth of these organisms, as water of this nature, once seeded, affords a peculiarly favorable medium for the propagation of these plants. Moreover, as this growth will tend to steadily increase, involving increased troubles from odors, it will shortly become imperative to adopt such form of storage for the well water as will afford protection from light.

Examination of two samples of water received from the Lebanon supply during the past week demonstrated the presence in both of colon bacilli. It seems evident that these bacilli must have passed through the filter from the filter gallery, as it is positively asserted that no water has been pumped directly from the canal during the past year. In view of the well-recognized nature and extent of the pollution to which the Mascoma River is subjected at points above the Lebanon intake, the significance of the persistent presence of colon bacilli in the filtered water should be clearly understood by the local board.

Respectfully submitted,

(Signed) C. D. HOWARD,
Chemist.

In view of all the facts, the board deemed it advisable to repeat substantially the advice given two years ago (See Vol. 18, p. 141, Report of the State Board of Health), as follows:

CONCORD, N. H., September 13, 1906.

C. E. Lewis, Chairman Board of Water Commissioners, Lebanon, N. H.

DEAR SIR: Regarding the samples of water recently sent by you to the State Laboratory of Hygiene for bacteriological examination, I would say that three of the samples showed the presence of the colon bacillus: One from the filter-well, one from the filter gallery, and one from the pumping station. The sample taken from the artesian well was negative, that is, did not contain this germ.

We are under the necessity of repeating substantially what was written to you two years ago today, September 13, 1904, to wit: that there is an element of danger in the use of this water so long as it contains the colon bacillus, and we would recommend that your water takers be notified of the condition and requested to boil the water before using it for drinking purposes.

It is certainly evident that there is sewage contamination, which should be recognized and every means possible taken to safeguard the health of the community. It is true that the recommendation to boil the water can be only partially effective, since a portion of every community will disregard advice of this kind; but some will doubtless heed it.

It must be evident to your board by this time that your method of filtration is defective, and it would seem to be the duty of the proper authorities to take measures as soon as practicable to remedy the defect. A few feet of intervening soil between a polluted stream and an excavated reservoir will not long remain an efficient filter; this has been demonstrated repeatedly, and it is, indeed, perfectly evident in your own experience.

Inclosed herewith is a copy of the report made by our chemist, Mr. C. D. Howard, who recently made a personal examination of your water system. I think this report contains in itself some valuable suggestions for your consideration. This whole subject is a matter which should receive careful consideration by your precinct or by your board of water commissioners, or both. We do not want to see the experience of Littleton repeated in Lebanon. Littleton was warned by the State Board of Health most specifically of the dangers that threatened that community, more than two years before the calamity befel them, and it was not until after an epidemic of typhoid fever of 139 reported

cases, with eleven deaths, that a water supply from an undoubted source was secured for that thriving village. So long as the colon bacillus appears in your water supply taken from Mascoma River, the citizens of Lebanon are not protected against such an experience as has been referred to.

Very truly yours,
(Signed) IRVING A. WATSON,
Secretary.

Inclosure.

The water company promptly notified the public that all water furnished from this system, to be used for drinking purposes, should be boiled.

Much interest is manifested in this subject, and it is only fair to state that an attempt is being made to secure a supply from a perfectly safe source. The present condition is such as to jeopardize the public health interests of the town, and this fact appears to be fully recognized. A new water supply is in view, and it is understood that the necessary surveys are to be made at an early date.

TYPHOID-INFECTED WELL AT WEST CANAAN.

There is an old well at West Canaan standing practically in the public square, although the real estate is owned by a private individual, the said well being in joint use by two or more families.

About the 25th of July, 1906, attention was called to the fact that some cases of typhoid fever had appeared among railroad employés at West Canaan, and that all of these patients had obtained water from the well referred to.

A sample of the water was taken by railroad authorities, was sent to the State Laboratory of Hygiene, where an examination showed it to be exceedingly foul, with the colon bacillus present.

The presence of typhoid fever, locally, was also reported, and Prof. H. N. Kingsford, bacteriologist to the board, was asked to investigate local conditions. His report was, in part, as follows:

The well at West Canaan which, in my opinion, is at the bottom of all the sickness, is a few rods back of the railroad station, and is situated on a knoll in the center of what is known as "The Square." It is not possible for any drainage to get into this well from the surroundings, except, possibly, from a house just back of it. The well is about ten feet deep, with five feet of water; stoned up, and covered with plank, but not very closely. It was dug about fifty years ago. They had to blast some when digging it.

A pump has been used ever since the well was dug, and it is cleaned out from time to time, the last time about seven years ago; it has never been cleaned way down to the bottom (that is, as nearly as I can learn).

The well is kept up by four men who live close by and who use most of the water. A few years ago, about five, they wanted to clean it out and make some repairs to the cover. They got together, and one of the men, having had some trouble with the others, refused to have anything to do with it, and put a claim on the pump then in the well. The other three then put in another pump. There has been more or less wrangling over the pump ever since.

July 4 some men and a number of boys pulled out the old pump, blew it into pieces with powder crackers, fired powder crackers into the well, and also broke the cover. Some of the men and boys were under the influence of liquor.

Previous to this time there had been no sickness around there, but very soon, within a few days after the 4th, a number of persons who used the water became sick, many with acute attacks of vomiting, headache, temperature and prostration. Blood gave positive Widal. No one was sick who had not used the water. The water contained colon bacilli. The increase in the nitrates is probably accounted for by the powder crackers in the water. . . .

One of the men had threatened to do something to the well, and on July 5 he told some men who were peeling telephone poles not to drink the water, as it would poison them. The people there think this man put something into the well. My idea is that some of the people about there on July 4, being more or less intoxicated, urinated into the well, and that among them was a walking case of typhoid or a convalescent. It is a well-known fact that virulent typhoid organisms are found in the urine weeks after convalescence.

I advised cleaning the well thoroughly, building it up about two feet higher, grading, and placing a tight cover over it, also a fence around to keep dogs from urinating against the pump; to have the water examined from time to time until it is pronounced good. I also told them to keep the well locked until they hear from you.

It is not known to what extent the infection was spread from this well, but it is reasonably certain that some twenty or thirty cases are directly traceable to it. One of the physicians of Canaan reports eight cases and one death that can be accounted for only in this way.

The board of health of Enfield, under date of August 29, 1906, reported five cases of typhoid fever that were contracted from the infected well at West Canaan. Numerous other cases are said to have been, either directly or indirectly, traced to this source.

The State Board of Health directed the local board of health to keep the well closed until the persons owning it were willing to clean it out thoroughly, and, after it had refilled and settled, to take a sample of the water and send it to the State Laboratory of Hygiene for analysis; then, in the event that the water was shown to be good, the well might be re-opened.

It may be said in connection with this subject that Dr. Kingsford's report was based upon personal examination of the locality, and the statements made to him by residents of the town. As to how the well was contaminated, that is a matter of speculation, as the local board of health has not been able to fasten the guilt upon any one, although there can be but little doubt that the well was maliciously polluted.

PROTECTION OF THE LISBON WATER SUPPLY.

The following petition was received from the board of health of the town of Lisbon:

LISBON, N. H., June 21, 1906.

To the State Board of Health, Concord, N. H.

GENTLEMEN: We, members of the board of health of the town of Lisbon, having reason to believe that the waters of Pearl Lake (more commonly known as Mink Pond), the source of a public water supply for the village of Lisbon, is in danger of contamination, and that local regulations are not sufficient or effective to prevent such pollution, respectfully petition the State Board of Health to investigate the case and to establish such regulations as may be deemed necessary for the protection of the said water supply against any pollution that in its judgment would endanger public health.

(Signed) GEORGE T. CONNOR,
FRANK E. SPEAR,
Board of Health of Lisbon, N. H.

Inclosed with the above petition was a communication from the management of the water system to the local board of health, as follows:

LISBON, N. H., May 19, 1906.

To the Board of Health, Town of Lisbon, N. H.

GENTLEMEN: Please permit us to call your particular attention to the condition, especially the sanitary condition, of the cottages situated on the shore of Pearl Lake, more commonly known as Mink Pond.

Pearl Lake contains about one hundred acres, and the water, as you well know, is the main supply for the town of Lisbon, and is used for both drinking and domestic purposes by said townspeople.

We call your attention more particularly to the cottages located on the immediate shore, and their condition. We also wish to call your attentlon to the practice of people bathing in said lake, and desire that the law regarding the same shall be enforced for the public safety and in order that the water may be as pure as possible to keep it.

Yours very truly,
(Signed) LISBON WATER WORKS COMPANY,
H. B. MOULTON, *President*,
LYMAN C. PAYNE, *Superintendent*.

An examination of the locality was made by the secretary of the State Board of Health, who reported that the water supply of Lisbon was taken from a brook, which was dammed so as to make a reservoir of somewhat

limited capacity, approximately two miles from the village and at an elevation sufficient to give ample pressure for hydrant and other service.

The source of supply is Pearl Lake, sometimes called Mink Pond, a body of water of some seventy-five or one hundred acres in extent, and situated a mile, approximately, above the reservoir. The brook from the lake to the reservoir runs beside the highway for a considerable distance, but there are no buildings from which drainage could enter the stream. In times of heavy rain, more or less wash from the highway goes into the stream, which, for short periods, gives the water a dirty appearance. While this is objectionable, particularly from an esthetic point of view, it is not probable that any serious danger to public health would result from this source. About the lake, itself, are a few cottages near the shores, but, with one or two exceptions, there was no possibility that contamination of the water could result therefrom. In the one or two exceptions referred to, the conditions were of some uncertainty, and, therefore, the local board of health was advised to make such alterations as would be necessary to remove all elements of danger.

It was understood that the application for the establishment of regulations by the State Board of Health was not on account of any existing danger, but rather to protect the water in the future.

After a consideration of the whole subject at a regular meeting of the State Board of Health, held July 17, 1906, the following regulations were adopted:

THE STATE OF NEW HAMPSHIRE.

Whereas, a legal petition has been presented to the State Board of Health, asking for the establishment of regulations to protect the public water supply of the Village of Lisbon, under the provisions of chapter 57, Laws of 1899, entitled "An Act for the Protection of Public Water Supplies," the following regulations are promulgated:

REGULATIONS OF THE STATE BOARD OF HEALTH
FOR THE
PROTECTION OF THE PURITY OF THE PUBLIC WATER
SUPPLY OF LISBON VILLAGE.

1. No privy, and no pig-pen, stable, or other building or structure in which horses, cattle, swine or fowls are kept, shall be built or maintained within seventy-five feet of the usual channel of Mink Pond Brook above the intake of the village water supply, or of Pearl Lake (commonly known as Mink Pond), or of any of their tributaries, except in such cases as the local board of health may permit, upon approval of the State Board of Health.

2. No sewage of any kind, sink-water, or water that has been used in washing or cleansing either materials, person or food, shall be allowed to run into said

stream (above said intake) or pond or their tributaries, or into any excavation or cesspool in the ground, or onto the surface of the ground, within seventy-five feet of the usual channel of said stream, pond, and their tributaries, except by consent of the board of health, under such conditions as they may make, with the approval of the State Board of Health.

3. No privy, pig-pen, cesspool or place of deposit upon the surface of the ground for sewage, sink-water, or water used for cleansing person or material, shall be allowed to exist where it can be reached by high water, or where rain or melting snow would be likely to wash said material into said stream or pond or their tributaries.

4. No dead animal, or parts thereof, or any article perishable or decayable, and no waste or garbage shall be deposited so near said stream or pond or their tributaries as to endanger the purity of the waters.

5. No person shall bathe or swim in said brook above the said intake, or in said pond.

6. No matter, waste, or materials such as are described in sections, 2, 3 and 4, shall be thrown, deposited or allowed to remain upon the ice of the waters of said stream or pond or their tributaries.

7. It is the duty of the local board of health to enforce the above regulations, and any person violating any regulation established by the State Board of Health for the protection of the water supply is liable to a fine of twenty dollars for each offense. (Sect. 2, Chap. 57, Laws of 1899.)

PROTECTION OF SQUAM LAKES.

September 1, 1906, the following petition was received:

To the State Board of Health of the State of New Hampshire:

Respectfully represent the undersigned that they have reason to believe that the body of water known as Little Squam Lake and Big Squam Lake, situate in the towns of Ashland, Holderness, Sandwich, Moultonborough and Center Harbor, in said state, and being a public water and ice supply for citizens and residents in said towns and others, is being contaminated and is in danger of further contamination, and that by reason of the location of said lakes in several towns, and for other reasons, the local regulations are not sufficient or effective to prevent such pollution.

Wherefore your petitioners pray that your honorable board will investigate the case and establish such regulations as your board may deem necessary for the protection of said water and ice supply against any pollution that in the judgment of your board would endanger the public health.

(Signed)

(DR.) J. M. CHENEY,
E. P. WARNER,
ORA A. BROWN,
Ashland Board of Health.

J. H. EVANS, JR.,
C. G. BURLEIGH,
LAWRENCE J. WEBSTER,
Holderness Board of Health.

(DR.) A. B. HOAG,
(DR.) F. E. BRYAR,
Sandwich Board of Health.

F. S. LOVERING,
GEORGE H. RICHARDSON,
Moultonborough Board of Health.

(DR.) L. B. MORRILL,
F. R. GAMMON,
Center Harbor Board of Health.

With this petition personally appeared the attorney of the Squam Lake Improvement Association, to discuss a point which had previously been brought up, to wit: Whether the State Board of Health had authority under the Public Statutes to comply with the requests embodied in the petition. It had been considered that the law referred to applied to corporate or municipal supplies, as ordinarily furnished the public through

pipes, etc. The position taken in this case was that no corporation, public or private, was taking water from the lake for general distribution. It was therefore agreed that the opinion of the attorney-general should be sought as to whether the State Board of Health had jurisdiction in the case; that the attorney for the Squam Lake Improvement Association should submit a statement of facts to the attorney-general, and that the secretary of the State Board of Health should officially ask for his opinion. Following are the communications covering this point:

SEPTEMBER 4, 1906.

Hon. E. G. Eastman, Exeter, N. H.

BROTHER EASTMAN: The matter I wanted to see you about today is a petition by the boards of health of the several towns about Squam Lake asking the State Board of Health to establish regulations to preserve the purity of the water in that lake. We presented the petition to Dr. Watson last week and he renewed a query which he advanced when we at first talked with him about the matter as to whether the Board of Health had jurisdiction in the case. He said that he should want to take your opinion on that question, and readily assented to my writing you the facts and our views of the law for your consideration in forming an opinion.

He seems somehow to have obtained the idea that our statute relating to this subject (Laws 1899, *c.* 57, *s.* 1) only covers the lakes which are a source of water supply through a municipal system.

You will see that the statute is as follows:

"Whenever any Board of Water Commissioners, local Board of Health or ten or more citizens of any town or city have reason to believe that a public water or ice supply is being contaminated or is in danger of contamination, and that the local regulations are not sufficient or effective to prevent such pollution, they may petition the State Board of Health to investigate the case and to establish such regulations as the State Board may deem necessary for the protection of the said supply against any pollution that in its judgment would endanger the public health."

You doubtless know that Squam Lake is a large body of water in three counties and at least five towns. Its outlet is through Squam River to the Pemigewasset, thence to the Merrimack. Within the last ten or fifteen years it has become a high grade summer resort. Many of the summer residents have built cottages upon the islands, and the only water supply for these cottages, numbering thirty or forty, is the lake. At least as many more cottages on the shore take water from the lake. While it might be possible to supply these from wells, it would in many cases be extremely expensive and inconvenient. So far as we know there is no aqueduct company which supplies water as a municipal enterprise or for corporate profit. In view of the extensive use which is made of the water, however, by the various members of the public who have occasion to use it, and in view of the evident purpose of the act to make it possible to protect users of public waters from the dangers of contamination, it has seemed to us clear that this is a "public water supply" within the meaning of the statute.

As an ice supply the lake assumes a distinctively public character. Two or

three public dealers take ice from the lake. Several hotels and practically all the summer residents secure their ice here, and a large number of the resident population are supplied from this source. It would be difficult to imagine a more typical case of a public ice supply.

We are acting in the matter as counsel for the Squam Lake Improvement Association, composed of summer and all the year round residents in the neighborhood of the lake who believe it absolutely essential to the safety of the public that such regulations should be established. The matter is particularly in the hands of the president and the vice-president of the association. The president is a citizen in Holderness, owning a large quantity of real estate and carrying on an extensive farm in connection with his shore property. The vice-president has charge of the Harvard Engineering Camp, located on the lake and accommodating from 150 to 200 students during the summer. The association represents practically the entire public sentiment of that region.

I am informed by Professor Huges and others that the conditions about the lake are far from perfect and that something must be done at once. There are so many towns involved in the matter that the local boards of health cannot deal with the situation.

We suppose Dr. Watson will refer the matter to you this week. We hope you will be able to give us a favorable opinion, as it would be a public calamity if something were not done, and if the present act does not cover this lake it will mean that we must go to the trouble and expense of a special act.

Yours truly,
(Signed) STREETER & HOLLIS.

Hon. E. G. Eastman, Attorney-General, Exeter, N. H.

DEAR SIR: We submit herewith a petition which has been presented to the State Board of Health, and upon which we desire your opinion as to whether or not under the provisions of Chapter 57, Laws of 1899, the State Board of Health has authority to establish regulations as asked for in the petition.

Will you kindly return the petition with your opinion at as early a date as convenient.

Respectfully yours,
(Signed) IRVING A. WATSON,
Secretary.

Inclosure.

THE STATE OF NEW HAMPSHIRE.

ATTORNEY-GENERAL'S OFFICE.

CONCORD, N. H., September 8, 1906.

Dr. Irving A. Watson.

MY DEAR SIR: Your favor, together with a petition in relation to the waters of Squam Lake is received.

It is my opinion that Section 1 of Chapter 57, Laws of 1899, is broad enough to cover this case. The act is general in its title and provisions, and the situation, according to the petition, is such as to demand immediate attention.

Respectfully yours,
(Signed) EDWIN G. EASTMAN,
Attorney-General.

Upon receipt of the opinion of the attorney-general the secretary of the State Board of Health made an inspection of the lakes, and reported to the board as follows:

INSPECTION OF LITTLE SQUAM AND BIG SQUAM LAKES.

Little Squam and Big Squam lakes are situated in the towns of Ashland, Holderness, Sandwich, Moultonborough and Center Harbor, and lie in three counties, Grafton, Carroll and Belknap, and have an area of sixteen square miles. They are surrounded by hills and mountains, have mostly well wooded shores, and are studded with over thirty picturesque islands.

The lakes are beautifully located, with most salubrious environments, but are not well known to the people of New Hampshire, for the reason, probably, that the foot of navigation on Squam River is approximately one mile distant from the railroad station at Ashland.

The Asquam Lake Navigation Company own four commodious steamers and one large gasolene boat, and run from a point on Asquam River, but one half mile above the village of Ashland, for about three quarters of a mile to Little Squam Lake; thence into the river that connects the two lakes, and into Big Squam Lake. The distance from the company's wharves at Ashland to Sandwich station, in a direct line, is approximately twelve miles.

On the shores of the lakes are located some hundred or more summer cottages, and two hotels, the Asquam House, situated on a high hill some distance from the lake, and the Mount Livermore Hotel, near the shore of the lake. The drainage from some of these cottages and one of the hotels finds its way directly into the lake.

There are also located on the shores of this lake ten camps. Seven in Holderness, and one each in Sandwich, Moultonborough and Center Harbor. The names of these camps and their approximate accommodations are as follows:

Sherwood Forest	20 boys.
Camp Wachusett	20 boys.
Dr. Talbot's Camp	20 boys.
Groton School	30—Charitable.
Camp Algonquin	30 boys.
Rockywold	30
Deephaven	50
Camp Hale	30—Charitable.
Harvard Engineering Camp	100 to 200—Summer School.
Camp Cloyne	20 to 30 boys.

Rockywold and Deephaven are practically run as hotels except that the guests are housed in numerous camps. Some, if not all, of the boys' camps are summer schools to some extent.

A majority, probably, of the cottages and camps use the lake water for domestic purposes, and a large quantity of ice is annually cut on these lakes. Therefore, taking all things into consideration, the request for rules and regulations to protect the purity of these waters seems to be reasonable.

It is practically impossible to obtain an accurate census of the number of persons that annually visit these lakes; but one indication of their patronage may be found in the fact that the Asquam Transportation Company up to the first day of September of the present year took over 6,000 fares on their steamers.

A voluntary organization, known as the Squam Lake Improvement Association, composed of residents and summer visitors, is endeavoring to maintain healthful conditions and to prevent the construction or creation of anything that would be detrimental to the large interests there represented.

When the beautiful location of these lakes, together with the healthful surroundings, is better known, there can be no question but that they will grow in popularity, so that there will eventually be many more cottages and summer visitors. Reasonable protective regulations can be established without serious difficulty or entailing any great expense to the owners of property.

All of the foregoing matters were presented to the State Board of Health, and were carefully considered at its regular meeting held at the state house, Concord, October 16, 1906, and the following regulations were adopted:

THE STATE OF NEW HAMPSHIRE.

Whereas, A legal petition has been presented to the State Board of Health, asking for the establishment of regulations to protect the purity of the water of Little Squam Lake and Big Squam Lake, under the provisions of Chapter 57, Laws 1899, entitled "An Act for the Protection of Public Water Supplies," the following regulations are promulgated:

REGULATIONS OF THE STATE BOARD OF HEALTH
FOR THE
PROTECTION OF THE PURITY OF THE WATER OF LITTLE SQUAM LAKE AND BIG SQUAM LAKE IN THE TOWNS OF ASHLAND, HOLDERNESS, SANDWICH, MOULTONBOROUGH AND CENTER HARBOR.

1. No privy, and no pig-pen, stable or other building or structure in which horses, cattle, swine, or other animals or fowls, are kept, shall be built or maintained within seventy-five feet of Little Squam Lake or Big Squam Lake (meaning high-water mark), or within seventy-five feet of any cove or inlet thereto, or within seventy-five feet of any stream tributary to said lakes, coves or inlets, except in such cases as the local board of health may permit, upon the approval of the State Board of Health, and under such regulations as they may require.

2. No sink-water, urine, or water that has been used for washing or cleansing either materials, person or food, shall be allowed to run into said lakes, or into any cove or inlet thereof, or into any stream tributary thereto, or into any excavation or cesspool in the ground, or on the surface of the ground within seventy-five feet of said lakes (meaning high-water mark), or of any cove or inlet, or within seventy-five feet of any stream tributary thereto, except by consent and under such regulations and conditions as may be approved by the State Board of Health.

3. No dead animal or fish, or parts thereof, or food, or any article perishable or decayable, and no dung, either human or animal, kitchen waste, swill or garbage shall be thrown into or deposited in said lakes, or left or permitted to remain within seventy-five feet thereof (meaning high-water mark), or into any cove or inlet of said lakes, or into any stream tributary thereto, or within seventy-five feet of such cove or inlet, stream or tributary.

4. No sawdust shall be thrown or be allowed to fall into said lakes, or into any stream tributary thereto.

5. No person shall bathe in said lakes within one-fourth mile of where water is taken for a public supply, or within like distance to any private intake pipe, provided notice to that effect is conspicuously posted in the vicinity.

6. No boat, either for public or private use, nor houseboat, nor other construction for use on said lakes shall have, keep or maintain a ship-closet, urinal, or other construction of easement which shall permit excrement or other offal to fall or empty into said lakes or any stream tributary thereto.

7. No matter, waste or materials such as are described in sections 2, 3 and 4 shall be thrown, deposited or allowed to remain upon the ice of the waters of said lakes, or upon that of any cove or inlet thereof, or of any stream tributary thereto.

8. It is the duty of the local board of health of the several towns named to enforce these regulations, and for the violation of any regulation established by the State Board of Health adequate punishment is provided by law.

9. The foregoing rules and regulations will take effect and be in force on and after June 1, 1907.

SICKNESS FROM SUSPECTED MILK.

The following letter from the board of health of Claremont, reporting a peculiar sickness in that town, was received the day of date:

CLAREMONT, N. H., November 24, 1905.

To Irving A. Watson, M. D.

DEAR SIR: We have ten or more cases of sickness in this town of a peculiar sort: Temperature, 101 to 104; nearly all have pain in head and back of neck; all have more or less bowel disturbance—sick now for a week or two, some of them. Doctor Jarvis reported eight of them two days ago; Doctor Dowlin has one. I saw one, myself, today. There may be others, as I have not had time to see all the physicians. A blood test has been made in some of the cases, but does not as yet show typhoid.

Now we have been looking into this as best we could and find this much: All of these people have had milk from the same milk dealer; all are quite heavy milk users; all are children but one, a man of middle age, who is quite a milk eater. We have been to see this milkman, and find that he has six cows; all look well, and stable fairly clean. His cows have not been out to pasture at all this summer, but kept in stable. Water supply is probably all right. He gets, in addition to his own milk, about twenty-eight or thirty quarts of milk each morning of other folks, usually at the car and of different ones. He told me of some eight or ten different ones that he had bought of. We know that two of the children, at least, have used milk from his own cows. Of course the use of this milk has been discontinued in all of these cases, and I am told that many of his patrons have stopped taking his milk.

Now something is wrong, somewhere, and I am writing you to find out what is to be done. The physicians here feel that you should come, or send some one here, to help us out and see if we can find the trouble.

Yours respectfully,
(Signed) A. L. MARDEN,
Secretary Board of Health.

This letter was replied to by telephone, and the particulars discussed. As some blood examinations had already been made at the laboratory by Dr. H. N. Kingsford, it was presumed that he was more or less familiar with the facts, and he was, therefore, asked to make an immediate investigation of local conditions, and to report all circumstances connected with the outbreak. This request was complied with, and the following report was rendered:

LABORATORY OF HYGIENE.

HANOVER, N. H., November 29, 1905.

Irving A. Watson, M. D., Secretary State Board of Health, Concord, N. H.

DEAR DOCTOR: I went to Claremont Monday morning, as requested, and found the following conditions:

There are nine cases of sickness, all children, ages between two and twelve years except one girl, whose age is sixteen. They all drink a great deal of milk. All have been quite sick, and there are at least two who are now seriously ill. These cases are under the care of Doctors Marden, Jarvis, Tolles and Dowlin.

The clinical symptoms seem to be about the same in all: First, high temperature, pain in head, muscles of the neck somewhat stiff, temperature highest at night, confined to bed, diarrhœa, pain in bowels, bleeding at mouth, dry skin, and in one case a few red spots on the abdomen. The physicians in charge do not seem inclined to call it typhoid fever, although one or two of the cases point strongly to typhoid, clinically. Nine blood examinations have been made, with negative results. All the cases are in pale and not particularly healthy looking children. The girl, age sixteen, has been run down from hard study at school. I saw seven of the cases, and although two of them resembled typhoid fever in many ways they are not typical, clinically. It was first noticed by Doctor Jarvis that all of his cases took milk from the same milkman. He made inquiries of the other physicians, and it was found that all the cases had milk from the same source. New cases were appearing every few days. The local board of health was notified, and this milkman ordered to discontinue delivering milk. No new cases have developed since Thursday, November 23, the day this order went into effect.

The milkman lives on the outskirts of the town, to the south; his buildings consist of house, barns, sheds and innumerable small buildings. Besides dealing in milk, he deals in hulled corn, plaster, lumber, phosphate and many other things. Most of the buildings are connected so that it is possible to go from one to another without going out of doors. The cows are kept in the basement of barn, there is very little light, and no opportunity for good circulation of air. The floor of the stable is damp, and showed evidence of having been very recently cleaned up. The cows and young stock looked plump, but they are covered with a large amount of filth, and have been kept in the barn or barnyard all summer and fall. They have not been pastured.

The privy is in a shed above, and at one end of the cow stable there are two holes, one emptying directly into the pig-pen, the other into a spout about twelve inches square, made of seven-eighths-inch boards, with cracks at the corners varying from one eighth to one quarter of an inch; all the evacuations and urine find their way into the pig-pen. The pig-pen is about eight by twelve and drains into the barnyard; the barnyard is a muck hole where there is more or less water standing all the time. The privy and pig-pen are from six to ten feet from the barnyard. There is another barnyard about twenty feet from this, through which runs a small brook; emptying into this brook, about one eighth of a mile above, are the sewers from two houses and barns. There is no sickness at these houses. Two samples of this brook water were taken, and bacteriological examination showed colon bacilli in large numbers. The water supply for the house and cows is from springs, and there are no dwellings on the watershed, but there is nothing to prevent the cows drinking all the brook water they want.

The method of washing cans is good, the water used is from the house supply. Six of the sick children have warm morning's milk He does not attempt to cool his milk in any way before delivering to his customers. He feeds good hay and grain, uses no malt or cotton seed. Samples of milk were taken in sterile tubes from the six cows giving milk; no tubercle bacilli were found, and the average number of bacteria found was 864. A sample of milk taken from a can showed many thousands, practically impossible to count them, and the colon bacillus was found in this milk; this milk had been in the can a number of hours. The sink drain runs out upon the grass on the west side of house, and probably does not drain into the barnyard.

The conditions about this place are ideal for the accumulation of filth, if there were cases of typhoid fever in the two houses discharging sewage into the little brook, or if there was typhoid in this house (and there has been a case of sickness in the house this fall), typhoid would, in all probability, result from the using of milk from these cows. The cows have been shut up all summer and fall, and being stabled in a low, dark, damp place wallowing about in sewage and other filth, and, being covered with filth themselves, cannot give milk of a very good quality. It would be impossible to milk these cows without removing millions of bacteria from their abdomens, udders and sides which would fall into the milk pail.

In my opinion, this sickness has been caused by drinking milk from these cows, the milk containing enormous numbers of bacteria, due to the unsanitary condition of the cows and surroundings. In my opinion, the disease is not typhoid fever, but some other form of intestinal inflammation due to some one or more of the bacteria contained in the milk.

Before this man is allowed to resume his milk business his stable and premises should be thoroughly renovated under the supervision of the local board of health, and his cows cleaned up and given a chance to keep clean.

Yours very truly,
(Signed) H. N. KINGSFORD.

Nearly a week after Doctor Kingsford's visit to Claremont, the following letter was received from Doctor Marden, secretary of the board of health:

CLAREMONT, N. H., December 2, 1905.

To Irving A. Watson, M. D.

DEAR DOCTOR: I am reporting the cases of sickness we have here as typhoid fever. The reports from blood examinations so far have been negative, but the clinical conditions all indicate typhoid; some of them are very ill. The only adult had a hard hemorrhage from the bowels day before yesterday. They have the red spots upon abdomen, bowels tender, and the usual temperature and tongue, etc. Two or three of them are better, and two, at least, are in a doubtful condition as regards recovery.

I presume Doctor Kingsford has told you about conditions that we found, but we have not received his report as yet. Doctor Jarvis is fully satisfied that his cases are typhoid fever, and one that I am attending I am sure is. Doctor Jarvis reports a case of typhoid in a man who is in no way connected with the other cases. No new cases among the milk users for a week at least.

Yours respectfully,
(Signed) A. L. MARDEN.

The foregoing was answered as follows:

CONCORD, N. H., December 4, 1905.

A. L. Marden, M. D., Chairman Board of Health, Claremont, N. H.

DEAR DOCTOR: I am in receipt of your favor of December 2, and in reply would say that we are greatly interested in the cases which you have in Claremont that resemble typhoid fever. It is not at all improbable that it is this disease, mostly in a mild or attenuated form.

I wish we might have some more blood specimens taken from the most advanced cases, to see if it is not possible to obtain the Widal reaction.

I would certainly suggest that your board handle the cases as if there were no doubt of the diagnosis—that is, that you treat them as typhoid fever.

Very truly yours,
IRVING A. WATSON,
Secretary.

It may be stated that a subsequent case, not of this group, gave the Widal reaction.

REPORT OF FOOD AND DRUG INSPECTION.

FOOD AND DRUG INSPECTION.

BY C. D. HOWARD, CHEMIST.

Dr. Irving A. Watson, Secretary State Board of Health.

DEAR SIR: A report of the work of the Laboratory relative to food and drug inspection for the biennial period ending September 30, 1906, is herewith submitted.

The methods and conditions under which the work of food inspection has been accomplished have remained as hitherto. As in the past, the demands on the Laboratory in connection with water-supply inspection have been great, at certain periods consuming practically the whole time. Since July 1, 1905, the analytical work for the State License Commission, in connection with the inspection of liquors, has been largely increased, over five hundred samples having been submitted during this period.

As heretofore, by far the larger proportion of the food samples analyzed have been collected in person by the chemists. A relatively small number have been submitted by private individuals, while, with a few exceptions, the samples representing milk, vinegar and oysters have been obtained through the coöperation of local boards of health.

Under the present system of inspection the duty falls upon the chemists not only of performing the laboratory examinations, but also, as far as possible or practicable, of making periodic trips to the larger towns for the double purpose of collecting samples and noting the extent to which regulations are being complied with by dealers. Obviously no very thorough or extensive inspection is thus possible; however, it may be stated that since the beginning of this work and the furnishing to citizens of a means for practicing discrimination in the purchase of food stuffs, a noticeably marked improvement in quality has taken place, the grosser and more flagrant forms of adulteration having practically disappeared, at least from the stores of reputable dealers—and the latter are, of course, in a great majority. That the results of analyses published in the *Bulletin* and thus disseminated to the public have been responsible for this improvement, and that such publicity has a most salutary influence in

determining the character of the goods shipped into the State, there can be no question.

Nevertheless, in spite of the recent general awakening, though more restricted in their scope than formerly there is probably quite as much effort and ingenuity being expended today as ever in devising means for defrauding the consumer. The truth of this is attested by the frequent appearance, from time to time, of new and unexpected forms of adulteration.

The evil of misbranding is, perhaps, the most serious one in this connection at the present time. There is a constant tendency to affix an untruthful label,—to make it appear to the consumer by statements, pictorial designs, or otherwise that the article named is better or different from what it actually is, or that by some alleged process of treatment it has been so improved or modified as to exhibit a certain property or properties, positive or negative, not possessed by the ordinary article. Thus we have extolled to us the merits of tannin-less coffees, de-nicotised cigars, and breakfast foods that are not only wonderfully endowed with nourishing and tonic properties, but are simultaneously in the nature of universal panaceas.

It is largely in this connection that most of the violations of the law occur. The habit of making exaggerated or untruthful statements with regard to articles used as food or medicine is so general that grocers and druggists are inclined to assume that the general public is apt to largely discount such claims in advance of purchase. While there may be some truth in this it should be no excuse whatever why dealers should carry on their shelves goods so labeled as to be plainly and flagrantly in violation of the law.

An important desideratum in connection with this work is the appointment of a regular inspector who shall give all, or at least a share of his time to these duties, and who shall be directly amenable to the instructions of the Board. While the work of collecting such staples as milk, cider vinegar, etc., has been delegated to local boards of health, and in the majority of cases has been promptly and cheerfully performed, nevertheless it is out of the question to expect health officers to devote any appreciable share of their usually fully-occupied time to any systematic and periodic inspection of general food and drug supplies.

EXAMINATIONS.

During the past two years 1,756 samples of food products have been examined. Of this number 825, equivalent to 46.9 per cent., were found to be adulterated, misbranded, or at variance with the standard. Many

Of these were so classed because of misbranding, or the use of antiseptics, the latter being contrary to a regulation of the State Board of Health.

The number of drugs examined was 182, of which 79, equivalent to 43.4 per cent., were found to be adulterated. As it is the custom to collect only suspected brands and only those classes of foods and drugs most liable to sophistication, these figures should not be construed as representing the state of adulteration actually existing. The fact is that the great majority of food products on sale in New Hampshire are above reproach.

BEVERAGES.

One hundred and thirteen samples, representing lime juice, grape juice, ginger ale and other so-called "soft drinks," were examined. All of the lime-juice samples contained preservative of some form, and were therefore classed as adulterated. In addition, many of these were deficient in acidity. On a number of brands a formula was displayed but in several instances the existence of such would never have been observed by the purchaser unless he were especially searching for it.

But one of the samples of grape juice contained antiseptics, and this brand as now appearing on the New Hampshire market is free from such.

Bottled soda, or "pop," is prepared by carbonating a solution of the appropriate syrup, colors and preserving agents being not infrequently added. In several instances we find that saccharin is being fraudulently employed to serve the dual purpose of sweetener and preservative. In a few cases where preservatives were found the quantity was so small as to admit of the inference that this material was probably contained in the syrup as purchased by the bottler, and not added directly by the latter.

The samples of strawberry and raspberry examined were wholly artificial, being prepared by tinting the syrup with aniline color and flavoring by the addition of a little synthetic essence. Consumers of this class of bottled drinks should understand in selecting these particular flavors that a decoction of this nature is what they will almost certainly receive. The better grades of orange soda contain genuine orange oil, or a form of such, but the color, especially of the "blood orange" variety, is apt to be intensified by the liberal use of aniline dye.

The examinations indicated that all the classes of beverages mentioned contain practically no alcohol.

RESULTS OF EXAMINATIONS OF ADULTERATED BEVERAGES.

LIME JUICE.

Brand.	Manufacturer.	Where Collected.	Preservative.
Mercantile Brand....	From Jamaica, W. I.....	Portsmouth.	Salicylic acid.
Mercantile Brand....	From Jamaica, W. I.....	Portsmouth.	Salicylic acid.
Princess Brand.....	From Jamaica, W. I.....	Portsmouth.	Salicylic acid.
Banner Brand, Jamaica.	Simpson Spring Co., Easton, Mass.	Portsmouth.	None.
Jamaica Lime Juice..	J. H. Folkins & Co., Boston.....	Portsmouth.	None.
.....	Dawson Bros., Leith.....	Dover.....	Sulphites.
Stump of the World..	D. H. Geer & Son, Boston.....	Dover.....	
Lemonade Syrup.....	Fred E. Flanders, Boston.....	Dover.....	
Royal.....	Boston Fruit Co., Boston.....	Dover.....	Sulphites.
Messina.....	J. W. P. Von Laer, Boston.....	Dover.....	Salicylic acid.
Jamaica.....	J. H. Folkins & Co., Boston.....	Dover..	Salicylic acid.
Sovereign.....	J. W. P. Von Laer, Boston.....	Somersw'th.	Salicylic acid.
Sovereign.....	J. W. P. Von Laer, Boston.....	Somersw'th.	Salicylic acid.
Rival.....	Haskell, Adams Co., Boston....	Concord	Salicylic acid.
Victor.....	Simpson Spring Co., Easton, Mass.	Concord	Benzoate of soda.
Banner.....	Simpson Spring Co., Easton, Mass.	Manchester.	Salicylic acid.
West India.....	Herbert Chapin, Boston.....	Concord	Sulphurous acid.
Imported.....	L. Rose & Co., London.....	Concord	Sulphurous acid.
Kingston Pure W. I..	.....	Nashua.....	Pres. with sulphites; deficient in acidity.
Stower's Cordial.....	A. Riddle & Co., London.....	Manchester.	Pres. with salicylic acid; deficient in acidity.
Sovereign	J. P. W. Von Laer & Co.....	Manchester.	Pres. with salicylic acid; deficient in acidity.
Stower's Lime Juice.	Lehn & Fink, Ag'ts, New York.	.....	Contains salicylic acid and below U. S. P. standard.

GINGER ALE.

Brand.	Manufacturer.	Where Collected.	Preservative.
Pureoxia.....	Pureoxia Co., Boston.....	Concord	Salicylic acid.
Delatour.....	Ackley Schuyler, New York....	Manchester.	Benzoate of soda.
Cliquot Club.....	Cliquot Club Co., Millis, Mass..	Concord ...	Benzoate of soda.

SODA WATERS.

Brand.	Manufacturer.	Where Collected.	Remarks.
Strawberry...	W. E. Glancy, Manchester.....	Manchester...	Color and flavor artificial.
Strawberry...	Ætna Bottling Co., Concord...	Concord	Color and flavor artificial.
Orange.....	Ætna Bottling Co., Concord....	Concord	No preserv.; color artificial.
Blood Orange	Rudolph Liebing, Manchester..	Manchester...	Contains saccharin, benzoate of soda and coal tar dye.
Lemon.....	Rudolph Liebing, Manchester..	Manchester...	Contains saccharin and benzoate of soda.
Strawberry...	Albany Steam Bottling Works, Manchester.	Manchester..	Color and flavor artificial.
Orange.....	Simpson Spring Co., South Easton, Mass.	Manchester...	Artificially colored.
Orange.....	Simpson Spring Co., South Easton, Mass.	Manchester...	Artificially colored.
Strawberry...	Simpson Spring Co., South Easton, Mass.	Manchester...	Color and flavor artificial.
Cherry Phos..	Chelmsford Spring Co., Chelmsford, Mass.	Concord	Artificially colored.
Strawberry...	Chelmsford Spring Co., Chelmsford, Mass.	Concord	Color and flavor artificial.
Orange Phos..	Chelmsford Spring Co., Chelmsford, Mass.	Concord	Artificially colored.
Blood Orange	Cliquot Club Co., Millis, Mass...	Manchester...	Artificially colored.
Blood Orange	J. J. Handley, Manchester.....	Manchester...	Contains saccharin and artificial color.
Raspberry....	J. J. Handley, Manchester.....	Manchester...	Color and flavor artificial.
Cliquot Club Sarsaparilla.	Cliquot Club Co., Millis, Mass...	Concord	Preserved with benzoate of soda.
Strawberry...	.....	No. Conway..	Preserv. and wholly artificial.

MISCELLANEOUS BEVERAGES.

Brand.	Manufacturer.	Where Collected.	Remarks.
Pan American Orangeade.	J. Hungerford Smith, Rochester, N. Y.	Concord	Preserved with benzoate of soda; artificially colored.
Buffalo Punch....	J. Hungerford Smith, Rochester, N. Y.	Concord	Preserved with benzoate of soda; artificially colored.
"Haf-O.".....	Granite State Bottling Co., Manchester.	Manchester.	Preserved with benzoate of soda.
Ambrosia Punch.	Curtis & Moore, Boston...	Concord	Preserved with salicylic acid.
Raspberry Punch	Haskell, Adams Co., Boston	Concord	Preserved with salicylic acid; artificially colored.
Cherry Syrup	Heinrich Kanenhaven, Konigsberg.	Manchester.	Preserved with salicylic acid.
Lemon Squash...	Kirker & Co., Belfast.....	Manchester.	Preserved with salicylic acid.
Nerve Tonic.....	J. J. Handley, Manchester	Manchester.	Contains saccharin.
Orangeade.....	Curtis & Moore, Boston....	Manchester.	Preserved with benzoate of soda; artificially colored.
Randall's Grape Juice.	Chautauqua Fruit Co., Fredonia, N. Y.	Manchester.	Preserved with benzoate of soda.
Orange Syrup....	.....	Nashua.....	Preserved with benzoate of soda; artificially colored.

CANNED FRUITS, JELLIES AND JAMS.

While there are still a great many cheap jellies and jams on the market this class of goods is lately coming to be more honestly labeled than in the past; and though certain manufacturers are still striving to see how little of the truth the formulas printed on the label shall tell, nevertheless the general public is not so much deceived as formerly. Indeed, the epithet "Compound" is coming to be somewhat derisively applied by consumer as well as dealer to the cheaper goods of this class.

However, so long as there is no misrepresentation and the price is reasonable, there can be no objection urged to their sale and use as food. The "apple stock,"—or "fruit juice" as it is frequently designated on the label,—which constitutes the greater part of the cheaper jellies and jams, is the product obtained by treating the residue from cider mills and evaporators with live steam and forcing the resulting liquid through a filter-press. This pectinous material is mixed with a certain amount of the fruit designated, sweetened with glucose, and usually a little aniline color added. In the case of jellies of this kind the flavor is frequently imparted by the addition of a synthetic essence, and a small amount of tartaric or phosphoric acid is also added to stiffen the product.

Canned fruits are liable to contain appreciable amounts of tin, dissolved from the walls of the can by the action of the fruit acids; in the case of material naturally bright in color the latter is also destroyed in connection with the corrosion process. The better grades of preserved fruits are now put up in lacquered tins. By this means the flavor is much improved and the necessity for a compensating addition of artificial color, formerly urged by the canner, no longer exists.

RESULTS OF THE EXAMINATIONS OF ADULTERATED CANNED FRUITS, JELLIES AND JAMS.

Brand.	Manufacturer.	Remarks.
Raspberry Pure Fruit.....	Logan, Johnson & Co., Boston	Col. with coal tar dye; pres. with benzoate and salicylate of soda.
Strawberry Jam, Selected...	F. P. Adams & Co., Boston....	Col. with coal tar dye; pres. with salicylate of soda.
Burn's Scotch Strawberry Jam	Ayer Preserving Co., Ayer, Mass.	Made from apple jelly, with slight admixture of pure fruit.
Raspberry Preserves (Compound)	J. W. Roberts & Co., Boston...	Colored with coal tar dye.
Raspberry Jam.....	Ayer Preserving Co., Ayer, Mass.	Made from apple jelly, col. with coal tar dye; very little pure fruit.
Fresh Fruit Strawberry Jam	Curtice Bros., Rochester, N. Y.	Contains much apple stock; preserved with benzoate soda.
Daisy Brand Raspberry (Compound)	Ayer Preserving Co., Ayer, Mass.	Wholly artificial; colored and flavored apple stock, preserved with benzoate soda.
Dillon's Fruit Jellies, Currant Flavor	Delano, Potter & Co., Boston..	Apple stock, col. and flav. and preserved with benzoate soda.
Beacon Brand Jelly, Pineapple Flavor	W. C. Morse & Co., Boston....	Apple stock, flavored and pres. with benzoate soda.
Blue Label Grape Jelly.....	Curtice Bros., Rochester, N. Y.	Preserved with benzoate soda.
Strawberry Fruit Preserves.	Logan, Johnson & Co., Boston	Much apple stock, colored and pres. with benzoate of soda.
Quince Flavor Jelly.....	Lutz & Schramm Co., Allegheny, Pa.	Apple stock, preserved with benzoate of soda.
Apple Jelly (Orange).....	Anderson Fruit Co., Camden, N. J.	Apple stock, preserved with benzoate of soda.
Currant Jelly (Compound) Queen City Brand	J. Weller Co., Cincinnati, Ohio	Apple stock, colored with coal tar dye.
Crystal Fruit Jelly (Comp.)..	Daniels, Cornell Co., Manchester	Colored with coal tar dye; preserved with benzoate of soda.
Raspberry Jelly (Comp.)....	.....	Apple stock, colored with coal tar dye.
Crescent Currant Jelly.....	Crescent Preserving Co., Camden, N. J.	Colored with coal tar dye.
Seal Brand Strawberry Preserves	P. J. Ritter Conserve Co., Philadelphia, Pa.	Preserved with benzoate of soda.
Highland Brand Strawberry Jam (Compound)	The Williams Bros. Co., Detroit, Mich.	Largely apple stock, colored with coal tar dye.
Dainty Lunch Preserves, Strawberry	H. A. Johnson & Co., Boston..	Colored with coal tar dye; preserved with benzoate of soda.
Leroy Extra Quality Strawberry Jam	Leroy Packing Co., Boston ...	Preserved with benzoate of soda.
Pure Apple Jelly.....	The Twitchell Champlin Co., Portland, Me.	Colored and preserved with benzoate of soda.
Pure Pineapple Jelly.....	The Twitchell Champlin Co., Portland, Me.	Apple stock, colored and preserved.
Pure Grape Jelly.....	The Twitchell Champlin Co., Portland, Me.	Apple stock, colored and preserved.
Pure Currant Jelly.....	The Twitchell Champlin Co., Portland, Me.	Apple stock, colored and preserved.
Pure Strawberry Jelly.....	The Twitchell Champlin Co., Portland, Me.	Apple stock, colored and preserved.
Apple Fruit Jelly, Currant Flavor	Oliver Day & Co., Boston.....	Highly colored with coal tar dye.
Metropolitan Preserves, Raspberry (Compound)	J. H. Folkins & Co., Boston....	Colored with coal tar dye; preserved with benzoate soda.
Manhattan Club Pure Apple Jelly	J. H. Folkins & Co., Boston....	Preserved with benzoate soda.
Victory Red Raspberry Jam	John Boyle Co., B'ltimore, Md.	Colored with coal tar dye.
Victory Blackberry Jam.....	John Boyle Co., B'ltimore, Md.	Colored with coal tar dye.
Victory Black Raspberry Jam	John Boyle Co., B'ltimore, Md	Colored with coal tar dye.
Currant Jelly.....	Ayer Preserving Co., Ayer, Mass.	Apple jelly colored with coal tar dyes and preserved with benzoate of soda.
Wild Strawberry Preserves.	Ayer Preserving Co., Ayer, Mass.	Colored with vegetable dye; preserved with salicylic acid.

RESULTS OF THE EXAMINATIONS OF ADULTERATED CANNED FRUITS, JELLIES AND JAMS.—*Continued.*

Brand	Manufacturer.	Remarks.
Pineapple	Ayer Preserving Co., Ayer, Mass.	Preserved with benzoate of soda.
Raspberry Jam	Logan & Johnson, Boston	Preserved with benz'ate of soda; colored with coal tar dye.
Damson Preserves Pure Fruit	Whitcher, Pillman & Co., Ayer, Mass.	Preserved with salicylic acid.
Raspberry Jam	Special Preserving Co., Lowell, Mass.	Colored with coal tar dye.
Raspberry Preserves	Baldwin, Lyon & Holt, Boston	Preserved with salicylic acid.
Strawberry Preserves	E. D. Pettingill & Co., Portland, Me.	Colored with coal tar dye.
Peach Jelly	Ayer Preserving Co., Ayer, Mass.	Preserved with benzoate of soda.
Strawberry Jelly	J. T. Pillman & Co., Ayer, Mass.	Preserved with benzoate of soda.
Currant Jelly	Conant, Patrick & Co., Portland, Me.	Preserved with benz'ate of soda; colored with coal tar dye.
White Daisy Red Raspberry	T. Eward & Co., New York	Preserved with benz'ate of soda; colored with coal tar dye.
White Daisy Brand Strawberries	T. Eward & Co., New York	Preserved with benz'ate of soda; colored with coal tar dye.
Raspberry Jam	Ayer Preserving Co., Ayer, Mass.	Preserved with benzoate of soda.
Strawberry Flavor Jelly		Colored with coal tar dye.
Currant Flavor Jelly	Williams Bros. Co., Detroit, Mich.	Entirely apple stock.
Golden Rod Strawberry Preserves	Milliken, Tomlinson & Co., Portland, Me.	Colored with coal tar dye; preserved with benzoate of soda.
Choice Strawberry	Ayer Preserving Co., Ayer, Mass.	Preserved with salicylic acid; colored with coal tar dye.
Our Best Strawberry Jam		Preserved with salicylic acid.
Strawberry Preserves	E. D. Pettingill & Co., Portland, Me.	Preserved with salicylic acid.
Raspberry Jelly		Colored with coal tar dye.
Raspberry Jelly (Comp.)	Kidwell Bros., Baltimore, Md.	Colored with coal tar dye.
Damson Jelly (Comp.)	Kidwell Bros., Baltimore, Md.	Colored with coal tar dye.
Strawberry Jelly	E. D. Pettengill & Co., Portland, Me.	Preserved with benzoate of soda.
Strawberry Jelly.	Shaw, Hammond & Carney, Portland, Me.	Colored with coal tar dye.
Raspberry Jelly	Shaw, Hammond & Carney, Portland, Me.	Colored with coal tar dye.
Currant Jelly	Shaw, Hammond & Carney, Portland, Me.	Colored with coal tar dye.
Strawberry Jam	Shaw, Hammond & Carney, Portland, Me.	Colored with coal tar dye.
Eagle Jams, Strawberry	Anderson Preserving Co., Camden, N. J.	Colored with coal tar dye.
Cherry Preserves	Logan, Johnson & Co., Boston	Colored with coal tar dye.
Winner Brand Raspberry Jam		Preserved with benzoate of soda.
Strawberry Jam	Ayer Preserving Co., Ayer, Mass.	Colored with coal tar dye.
Raspberry Jam	Ayer Preserving Co., Ayer, Mass.	Preserved with benzoate of soda.
Raspberry Jam	Country Preserving Co., Keene	Colored with coal tar dye.
Preserved Strawberry	E. D. Pettingill & Co., Portland, Me.	Mainly apple stock; contains added color and preservative.
Shaker Strawberry Jam	E. D. Pettingill & Co., Portland, Me.	Slightly colored.
Apricot Jam	Kidwell Bros. Co., Baltimore, Md.	Largely apple stock.

RESULTS OF THE EXAMINATIONS OF ADULTERATED CANNED FRUITS, JELLIES AND JAMS.—*Continued.*

Brand.	Manufacturer.	Remarks.
Raspberry Jelly	C. A. Weston & Co., Portland, Me.	Base of apple stock; colored with coal tar dye.
Raspberry Jelly	Reliable Preserving Co., Boston	Base of apple stock; colored with coal tar dye.
Jelly "Currant Flavor"	Conant, Patrick & Co., Portland, Me.	Base of apple stock; contains added color and preservative.
Raspberry Jam	Logan, Johnson & Co., Boston	Labelled as containing benzoate of soda.
Quince Jelly	Logan, Johnson & Co., Boston	Mainly apple stock; contains added color.
Peach Jelly	Logan, Johnson & Co., Boston	Mainly apple stock; contains added color.
Strawberry Jelly	Ayer Preserving Co., Ayer, Mass.	Mainly apple stock; contains added color and preservative.
Currant Jelly	Ayer Preserving Co., Ayer, Mass.	Wholly apple stock; contains coal tar dye and benz'ate soda.
Strawberry Jam	Alonzo A. Knight & Son, Boston	Colored with coal tar dye.
White Daisy Red Raspberry	T. Eward & Co., New York	Largely apple stock; contains added color.
Damson Preserve	Central Preserving Co., Boston	Mainly apple stock; contains coal tar dye and benz'ate soda.
Extra Quality Strawberry Jam	Haskell, Adams & Co., Boston	Largely apple stock; contains coal tar dye and benz'ate soda.
Strawberry Jam	Ayer Preserving Co., Ayer, Mass.	Mainly apple stock; contains coal tar dye and benz'ate soda.
Burns Scotch Strawberry Jam	Ayer Preserving Co., Ayer, Mass.	Mainly apple stock; contains coal tar dye and benz'ate soda.
Shaker Raspberry Jam	E. D. Pettingill & Co., Portland, Me.	Largely apple stock; contains benzoate of soda.
White Daisy Red Raspberry	T. Eward & Co., New York	Mainly apple stock; contains added color.
Columbia Currant Jelly	Columbia Preserving Co., Boston	Preserved with salicylic acid; artificially colored.
Red Raspberry Preserves	Lutz & Schramm, Allegheny, Pa.	Artificially colored; illegal.
Sunbeam Red Raspberry Preserves	Austin Nichols & Co., New York	Artificially colored; illegal.
Nabob Currant Jelly	F. H. Leggett & Co., New York	Largely apple stock.
Perfect Strawberry Preserves	A. T. Knowles & Co., Boston	Chemically preserved; illegally labelled.
Homemade Green Gage Jam	J. T. Pilman Co., Ayer, Mass.	Contains apple stock, starch and salicylic acid.
Reliable Raspberry Flavor Jelly	Joseph Middleby, Boston	Preserved with benzoate of soda.
Reliable Currant Flavor Jelly	Joseph Middleby, Boston	Preserved with benzoate of soda.
Reliable Crab Apple Flavor Jelly	Joseph Middleby, Boston	Preserved with benzoate of soda.
Daisy Raspberry Jelly	Country Preserving Co., Woodsville	Illegally labelled.
Daisy Currant Jelly	Country Preserving Co., Woodsville	Illegally labelled.
Strawberry Flavor Jelly	Haskell, Adams Co., Boston	Preserved with benzoate of soda.
Quince Flavor Jelly	Haskell, Adams Co., Boston	Preserved with benzoate of soda.
Currant Flavor Jelly	Haskell, Adams Co., Boston	Preserved with benzoate of soda.
Peach Flavor Jelly	Haskell, Adams Co., Boston	Preserved with benzoate of soda.
Varick Currant Jam	Manhattan Preserving Co., New York	Chemically preserved; illegally labelled.
Perfect Raspberry Preserves	A. T. Knowles & Co., Boston	Chemically preserved; illegally labelled.
Reliable Quince Flavor Jelly	Joseph Middleby, Boston	Preserved with benzoate of soda.
Grape Jelly	A. A. Knights & Sons, Boston.	Chemically preserved; illegally labelled.

RESULTS OF THE EXAMINATIONS OF ADULTERATED CANNED FRUITS, JELLIES AND JAMS.—*Concluded.*

Brand.	Manufacturer.	Remarks.
Strawberry Jelly	A. A. Knights & Sons, Boston.	Chemically preserved; illegally labelled.
Quince Jelly	A. A. Knights & Sons, Boston.	Chemically preserved; illegally labelled.
Peach Jelly	A. A. Knights & Sons, Boston.	Chemically preserved; illegally labelled.
Currant Jelly	A. A. Knights & Sons, Boston.	Chemically preserved; illegally labelled.
Superior Raspberry Jam	W. C. Morse, Boston	Largely apple stock; illegally labelled.
Superior Strawberry Jam	W. C. Morse, Boston	Largely apple stock; illegally labelled.
Crystal Currant Jelly	Daniels, Cornell Co., Manchester	Chemically preserved; illegally labelled.
First Quality, Strawberries	J. S. Farren & Co., Baltimore, Md.	Contains much dissolved tin.
Victory Canned Strawberries	John Boyle Co., Baltimore, Md.	Contains much dissolved tin.

CANDY, AND THE USE OF ADULTERATED GLUCOSE IN ITS MANUFACTURE.

Glucose, to a greater or less extent, enters into the composition of practically all of the cheap candy now on sale. Known also under the names of starch sugar and corn syrup, and in the crystallized condition as dextrose, or grape sugar, this sweetening material is now prepared in enormous quantities by boiling corn starch with dilute hydrochloric acid, the starch being gradually converted by this process into sugar, which, after refining, is placed upon the market in the form of a very heavy, nearly water-white syrup. Although not so sweet as cane sugar, pure glucose is a perfectly wholesome compound, possessed of a definite food value. Its advent has revolutionized the confectioner's art, this form of sugar, aside from the mere circumstance of its cheapness, being much better adapted for certain candy-making processes than the more expensive cane sugar.

However, candies made too largely of glucose are inclined to stickiness. To overcome this tendency and to allow of the incorporation of a larger amount of glucose than would normally be possible, we find that it is a practice with certain confectioners to add to the syrup a concentrated solution of bisulphite of soda. Recently our attention was called to a preparation of the latter, sold under the name of "Cyrantis."

In response to our inquiry addressed to the National Confectioners' Association, the chairman of its executive committee disclaimed any knowledge of the use of bisulphites in this connection. Nevertheless, on page 183 of the Proceedings of the Twenty-second Annual Convention of the National Confectioners' Association is to be found as a part of the quoted report of the Illinois food commissioner relating to candies, the

statement that "Sodium acid sulphite is used for the purpose of incorporating more glucose in candy than could be normally used, particularly in stick candy. It is often used in glucose for bleaching and preserving purposes, and has been said to be more lavishly used in confectioner's glucose than in any other grade. Sodium acid sulphite acts as free sulphuric acid —attacks organic matter and is unqualifiedly objectionable in any food product in large or small proportion." Further confirmation of the existtence of this practice is to be found in a letter received from the manager of a large firm of sugar manufacturers, in which he states that "it has been the practice among a good many candy makers to add a concentrated solution of bisulphite of soda in order to prevent the candy from becoming too sticky."

It would seem very probable, however, that in a majority of cases it is the glucose refiner, and not the confectioner, who is responsible for this form of adulteration. Winton (Report Conn. Experiment Station, 1901, Part 2) alludes to the practice of the manufacturer of frequently adding bisulphite of soda during the process of manufacture, as a bleaching agent. "Oftentimes the amount present is sufficient to give the syrup a disagreeable taste. Since sulphites, bisulphites and sulphurous acid are all powerful antiseptics and preservatives, the sale of food products containing them is, in this state, illegal."

The following table shows the results of the examinations of samples of glucose collected from various localities:

SULPHUROUS ACID IN GRAMS OF CONFECTIONER'S GLUCOSE.

Lab. No.	Collected at	Manufacturer.	Free sulphurous acid. Grams.	Total sulphurous acid. Grams.	Equivalent to sodium bisulphite. Grams.	Chlorides.
2687	Concord.....	....	0.0864	0.1408	0.2280	Heavy.
2692	Concord.....	....	0.0832	0.1376	0.2229	Heavy.
2693	Concord.....	.....	0.0672	0.1216	0.1969	Heavy.
2704	Dover.....	.....	0.0896	0.1568	0.2540	Heavy.
2705	Dover.....	....	0.0575	0.1280	0.2073	Heavy.
2706	Dover..... ...	.....	0.0704	0.1376	0.2229	Heavy.
2763	Rochester ...	Glucose Refining Co., Chicago.....	0.0992	0.1824	0.2954	Heavy.
2764	Rochester ...	.....	0.0832	0.1440	0.2332	Heavy.
2765	Manchester..	New York Glucose Co.....	0.0576	0.1056	0.1710	Heavy.
2766	Manchester..	American Glucose Co., Buffalo, N. Y.....	0.0960	0.1723	0.2799	Heavy.
2767	Manchester..	American Glucose Co., Buffalo, N. Y.....	0.0990	0.1760	0.2851	Heavy.
2768	Manchester..	Glucose Refining Co., Chicago.....	0.1056	0.1888	0.3058	Heavy.
2769	Manchester..	Warner Glucose Refinery, Waukegan, Ill..	0.0640	0.1120	0.1814	Heavy.
2852	Keene.....	Crandall & Godfrey, New York.	0.0736	0.1312	0.2125	Heavy.
2851	Keene.....	American Glucose Co., Buffalo, N. Y.....	0.0816	0.1550	0.2511	Heavy.
2850	Keene.....	American Glucose Co., Buffalo, N. Y.....	0.0448	0.0960	0.1555	Heavy.
2853	Rochester....	New York Glucose Co.....	0.000	0.000	0.000	

All of these samples (with the exception of No. 2853) exhibited a more or less pronounced sulphurous taste, and on diluting with water and boiling with a drop of acid, gave the pungent odor of sulphurous acid in a very marked degree. While it is unquestionably true that much of this compound is driven off during the boiling process in candy making, it is nevertheless evident from the analyses given below that an objectionable quantity is retained in the finished product.

Whether the bisulphite is added by the refiner on account of any specific advantage accruing from such to the confectioner, or whether such use is for bleaching purposes, is immaterial in connection with the point at issue, which is that the presence of such material, under the law, constitutes an adulteration, and vendors of candy thus adulterated will be liable to prosecution.

RESULTS OF EXAMINATIONS OF CHEAP CANDIES.

Lab. No.	Variety.	Grams sulphurous acid in 100 grams candy.
2684.	Cream peppermints	0.016
2685.	Mixed candy	0.019
2681.	Cream peppermints	0.038
2682.	Chocolate coated dates	0.013
2679.	Chocolate creams	0.016
2680.	Chocolate creams	0.020
2678.	Bon bons	0.012
2675.	Fancy ten cent mixture	0.036
2674.	Fancy ten cent mixture	0.007
2673.	Marshmallows	0.016
2671.	Bon bons	0.016
2672.	White candy balls	0.008
2659.	Mixed bon bons	0.024
2669.	Mixed candy	0.010
2658.	Cream peppermints	0.017
2660.	Cream walnuts	0.029
*2656.	Broken candy	large quantity
2676.	Large sugar discs	traces
2670.	Candy balls	traces
2683.	Chocolate creams	0.020
2677.	Hard peppermints	none
2657.	"Suckers"	none
2854.	Half glucose, half cane sugar, long boiled	0.0576

* Colored with iron oxide.

CATSUPS.

The adulteration consists in the use of artificial color and antiseptic, and the addition of starch or other substance as a filler. Seventy-seven samples were examined, of which number sixty-six were classed as adulterated. The recent general reaction on the part of the public against the use of artificially-colored foods has had a marked effect in the case of catsups, and while two years ago a colored catsup was the rule, today only the inferior or bogus brands are thus colored.

On the other hand, it is also the consumer who is responsible for the present general use of antiseptic in catsup. So long as the manufacturer observes ordinary precautions there is no difficulty whatever in preparing an article that will remain unfermented indefinitely, unopened. Preservative is added because the public has formed the habit of buying catsup in large bottles and allowing the latter to stand open upon the table subjected to all ranges of temperature, frequently for weeks, complaint being made if the preparation thus treated fails to "keep."

RESULTS OF THE EXAMINATIONS OF ADULTERATED CATSUPS.

Brand.	Manufacturer.	Remarks.
Bordeaux Tomato	Standard Packing Co., Indianapolis	Artificially colored and preserved.
High Grade Tomato	Haskell, Adams Co., Boston	Artificially colored and preserved.
Homemade	Downing-Taylor Co., Springfield, Mass.	Preserved with benzoate of soda.
Yankee Doodle	American Relish Co., Indianapolis	Preserved with benzoate of soda.
Golden Rod Tomato	Milliken, Tomlinson Co., Boston	Artificially colored and preserved.
Columbia Tomato	Mullen & Blackledge Co., Indianapolis	Artificially colored and preserved.
Snider's Tomato	T. A. Snider Preserving Co., Indianapolis	Artificially colored and preserved.
Eclipse Tomato	M. J. & H. J. Meyer Co., N. Y.	Artificially colored and preserved.
Van Camp's Tomato	Van Camp Packing Co., Indianapolis	Artificially colored and preserved.
Mayflower Tomato	Ayer Preserving Co., Ayer, Mass.	Artificially colored and preserved.
Berkshire Tomato	Standard Packing Co., Indianapolis	Preserved with benzoate of soda.
Tomato	Lutz & Schramm, Allegheny, Pa.	Preserved with a sulphite.
Sunnyside Tomato	Tip Top Ketchup Co., Cincinnati	Artificially colored and preserved; much starch.
Our Favorite	Farnham Canning Co., Farnham, N. Y.	Preserved with benzoate of soda.
Sunnyside	Tip Top Ketchup Co., Cincinnati	Pres. with benzoate of soda; col. with coal tar dye; starch filler.
Champion	Champion Preserving Co., New York	Pres. with benzoate of soda; col. with coal tar dye; starch filler.
Home Made	Charles Lawrence & Co., Boston	Preserved with salicylic acid; colored with coal tar dye.
Peerless	C. E. Moody & Co., Boston	Preserved with benzoate of soda; colored with coal tar dye.
Howard's Home Made	J. F. Howard, Haverhill, Mass,	Pres. with benzoate of soda; col. with coal tar dye; starch filler.
Burbank's	J. S. Burbank & Co., Manchester	Preserved with salicylic acid; colored with coal tar dye.
Standard	C. B. Marshall, Nashua	Pres. with benzoate of soda; col. with coal tar dye; starch filler.
Luxury	J. H. Wiggin & Co., Manchester	Preserved with sulphites.
Snider's Home Made	T. A. Snider Preserving Co., Cincinnati	Preserved with benzoate of soda.
Columbia	Columbia Conserve Co., Indianapolis	Preserved with benzoate of soda; starch filler.
Nail City	West Virginia Preserve Co., Wheeling	Preserved with benzoate of soda; colored with coal tar dye.
Heinz	H. J. Heinz Co., Pittsburg, Pa.	Preserved with benzoate of soda.
Pride of Rhode Island	American Pickling Co, Providence, R. I.	Pres. with benzoate of soda; col. with coal tar dye; starch filler.
Blue Label	Curtice Brothers Co., Rochester, N. Y.	Preserved with benzoate of soda.
Crescent	Charles L. Hirsch & Co., N. Y.	Pres. with benzoate of soda; col. with coal tar dye; starch filler.
Standard Quality	C. B. Marshall, Nashua	Pres. with benzoate of soda; col. with coal tar dye: starch filler.
Home	Charles F. Louden, Cincinnati	Preserved with benzoate of soda; colored with cochineal.
Columbia	Mullen-Blackledge Co., Indianapolis	Preserved with benzoate of soda; colored with coal tar dye.
Van Camp's	Van Camp Packing Co., Indianapolis	Preserved with benzoate of soda; slightly colored.
Campbell's Chili Sauce	Joseph Campbell Preserve Co., Camden, N. J.	Preserved with benzoate of soda; slightly colored; starch filler.
Blossom Gooseberry	McNeil & Higgins Co., Chicago	Colored with coal tar dye; starch filler.
Old Virginia Chili Sauce	G. K. McMechen & Sons Co., Wheeling	Preserved with benzoate of soda; colored with coal tar dye.
Fort Henry Chili Sauce	West Virginia Preserving Co., Wheeling	Preserved with benzoate of soda; colored with coal tar dye.
Snider's Chili Sauce	T. A. Snider Preserve Co., Indianapolis	Preserved with benzoate of soda.

EXAMINATION OF CATSUPS.—*Concluded.*

Brand.	Manu acturer.	Remarks.
Bull	Eagle Extract Co., Boston	Colored with coal tar dye.
"O. K."	Alast & McGuire, New York	Colored with coal tar dye; preserved with benzoate of soda.
Columbia	Columbia Conserve Co., Indianapolis	Preserved with benzoate of soda.
Columbia	Mullen-Blackledge Co., Indianapolis	Colored with coal tar dye; preserved with benzoate of soda.
Brownie	Brownie Packing Co., Boston.	Artificially colored; preserved with benzoate of soda.
Maple Leaf	Blake-Curtis Co., Haverhill, Mass.	Preserved with benzoate of soda.
Tomato	Ayer Preserving Co., Ayer, Mass.	Colored with coal tar dye; preserved with benzoate of soda.
Superior	J. F. Howard, Haverhill, Mass.	Colored with coal tar dye; preserved with benzoate of soda.
Bordeaux	Standard Packing Co., Indianapolis	Artificially colored; preserved with benzoate of soda.
Everybody's	Granite State Ketchup Co., Manchester	Colored with coal tar dye; preserved with salicylic acid.
Red Berry	Leroy Packing Co., Boston	Preserved with benzoate of soda.
Blackstone Valley	Fournier & Schiller, Central Falls, R. I.	Colored with coal tar dye; preserved with benzoate of soda.
Champion	Champion Preserving Co., Wheeling	Colored with coal tar dye; preserved with benzoate of soda.
Waldorf	Williams Brothers Co., Detroit, Mich.	Preserved with benzoate of soda.
Champion	Champion Preserving Co., Wheeling	Colored with coal tar dye; preserved with benzoate of soda.
Crescent	Charles L. Hirsch & Co., N. Y.	Colored with coal tar dye.
Catsup	E. E. Clifford & Co., Portland.	Colored with coal tar dye; much starch.
Yankee Doodle	American Relish Co., Indianapolis	Colored with coal tar dye; preserved with benzoate of soda.
Golden Rod	Milliken, Tomlinson Co., Portland	Colored with coal tar dye; preserved with benzoate of soda.
Montauk Point	E. E. Clifford & Co., Portland.	Colored with coal tar dye; preserved with benzoate of soda.
Mt. Kineo.	Shaw, Hammond & Carney, Portland	Colored with coal tar dye; preserved with benzoate of soda.
Libby's	Libby, McNeil & Libby, Chicago	Preserved with benzoate of soda.
Gladstone	Briggs, Seaver & Co., Boston.	Colored with coal tar dye; preserved with benzoate of soda.
Berkshire	Standard Packing Co., Indianapolis	Colored with coal tar dye; preserved with benzoate of soda.
Sunflower	Bay State Preserving Co., Boston	Preserved with benzoate of soda.
Catsup	Chatham Packing Co., Boston	Colored with coal tar dye; preserved with benzoate of soda.
Chili Sauce	West Virginia Preserving Co., Wheeling	Colored with coal tar dye; preserved with benzoate of soda.

COFFEE AND COCOA.

Cocoa adulterated with cereal starch was found in two cases. Four samples of ground package coffee were found to be misbranded, the claim being that tannin and caffein had been removed. (See special article elsewhere entitled "Tannin in Coffee.")

MISBRANDED COFFEES FOUND ON SALE.

Brand.	Manufacturer.	Nature of fraudulent representation.
Royal Dutch.....	Walter McEwen, Albany, N.Y.	Claimed to be free from tannin and caffein.
Detanated.....	Clark, Coggin & Johnson, Boston	Claimed to contain no tannin.
Barrington Hall	Baker & Co., Minneapolis.....	Claimed to contain no tannin.
Digesto.	Digesto Coffee Co., New York	Claimed to be free from tannin and caffein.

CREAM OF TARTAR AND BAKING POWDERS.

Four samples of cream of tartar sold in bulk were found to be adulterated with starch, gypsum, and phosphate of lime. All of the cream of tartar now on the market sold in packages appears to be pure.

ADULTERATED CREAM OF TARTAR AND BAKING POWDER.

Brand.	Manufacturer.	Available carbon dioxid.	Remarks.
Queen Quality Cream Tartar	J. Smith Brockway Co., Boston	.....	Compound of starch, alum, calcium acid phosphate.
Pilgrim Baking Powder.....	Pilgrim Baking Powder Co., Boston	4.10%	Less than one half normal strength.
Washington Baking Powder	.....	3.80%	Less than one half normal strength.
Crystal Baking Powder.....	Crystal Baking Powder Co., Boston	1.48%	Less than one sixth normal strength.
I. C. Baking Powder.....	Jaques Manufacturing Co., Chicago	3.86%	One third normal strength.
Silver Star Baking Powder..	Canby, Ach & Canby, Dayton, Ohio	3.27%	One third normal strength.
Golden Rod Baking Powder	Canby, Ach & Canby, Dayton, Ohio	6.12%	Below normal strength.
Sunshine Dime Baking Powder	The R. T. French Co., Rochester, N. Y.	3.69%	One third normal strength.
Queen Quality Cream Tartar	J. Smith Brockway Co., Boston	.....	Compound of starch, alum, calcium acid phosphate.
Cream of Tartar, in bulk....	.....	.....	No. cr. tartar; mixture lime phosphate and cornstarch.
Cream of Tartar, in bulk....	.....	.....	Little cr. tartar; largely lime phosphate and cornstarch.
Cream of Tartar, in bulk....	.....	.....	Adulterated with gypsum.

DRIED FRUITS.

Seven out of twenty-three samples examined were found to have been bleached with sulphurous acid. But one dessicated cocoanut thus treated was found. In certain other states the adulteration of dessicated cocoanut in this manner has been practised to a large extent, the content of sulphurous acid in some cases being very great. But one sample of evaporated apple was examined, and this proved to be free from any adulteration or impurity.

DRIED FRUITS CONTAINING SULPHUROUS ACID.

Brand.	Wholesaler or Packer.	Collected at	Remarks.
Citron.....	.....	Dover.....	Contains 0.016% sulphurous acid.
Dried Apricots.....	.....	Dover.....	Contains 0.0688% sulphurous acid.
Dried Apricots.....	.....	Dover.....	Contains 0.0720% sulphurous acid.
Dried Apricots.....	.....	Dover.....	Contains 0.0192% sulphurous acid.
Dried Apricots.....	.....	Dover.....	Contains 0.0208% sulphurous acid.
Dried Apricots.....	.....	Portsmouth.	Contains 0.0608% sulphurous acid.
Shredded Cocoanut.	W. L. Goodnow Co., Keene	Keene.....	Chemically bleached and preserved.

HONEY.

Thirty samples of this material examined included thirteen that were adulterated. Most of the honey now on sale is of the so-called extracted variety, obtained by placing the hive-contents in a rotary wire cage. On revolving the latter rapidly, the honey is separated and thrown out from the comb by centrifugal force.

One of the samples examined, bearing the label of a reputable concern, was found to contain an unduly large proportion of cane sugar for a pure, unfed honey. In this connection the following is quoted from the July, 1906, issue of the *Bulletin*:

In the past, some difference of opinion has existed as regards the normal cane sugar content of honey. According to Allen,[1] "occasionally a small percentage of sucrose appears to be normally present, especially in new honey from bees fed on cane sugar, but after a time this constituent undergoes inversion by the trace of free acid or some ferment present in the honey." Leffman & Beam[2] state that "if sucrose be present in but small amount in the nectar of flowers, it may be entirely inverted in the bee, or after deposition in the hive, the resulting honey being quite free. The maximum proportion that may be present in pure honey is as yet unknown. Some authorities have proposed five per cent., others are disposed to allow a much higher proportion, but it is probable that the lower limit will rarely be exceeded in pure samples."

The maximum content of cane sugar recognized in pure honey by the United States Department of Agriculture is eight per cent., and this standard has also been specifically adopted by the legislatures of several states. When, therefore, this figure is materially exceeded, it has been the custom to infer that such is due to the feeding of sucrose to the bees, either with fraudulent intent or carelessly. However, in the case under consideration, the producers strenuously urge that they have been duly careful to feed no more than the least possible quantity of sugar required at the period when artificial feeding is necessary, and, in view of the business reputation of this firm and its standing in the industry, it is believed that this claim is conscientiously made.

[1] Allen's "Commercial Organic Analysis."
[2] Leffman & Beam's "Food Analysis."

There would seem to be opportunity for investigation relative to the possible bearing upon the sucrose content of modern methods of ripening and packing honey. As yet, the exact nature of the agency causing the inversion of cane sugar in honey does not seem to have been determined, but it is certain that, at least up to a certain point, this inversion steadily proceeds after packing. The firm alluded to has recently adopted the practice of "pasteurization" of their goods during the packing process. Comparative determinations made by us on several jars of the same output originally submitted to different treatments, showed, unexpectedly, a higher sucrose content in the jars subjected to a temperature of 160–175 degrees Fahrenheit. Provided this phenomenon should be demonstrated to be a constant one, the only apparent explanation therefor would be that inversion is due mainly to a digestive ferment that is destroyed by the pasteurization process.

ADULTERATED HONEY.

Brand.	Where Collected.	Polarization.		Remarks.
		Direct.	Invert.	
Compound Honey 50% Corn Syrup, 50% Honey	Manchester.	71.20	58.00	Not true to formula as corn syrup is largely in excess of honey.
White Clover Honey.....	Penacook...	124.0	124.0	Entirely glucose. Contains no honey.
White Clover Honey.....	Portsmouth.	143.2	136.0	Almost entirely glucose.
White Clover Honey Compound.	Newmarket.	168.0	165.5	Entirely glucose.
California Honey Compound	Newmarket.	158.0	154.0	Entirely glucose.
White California Honey	Dover.....	26.88	26.80	Contains glucose.
California Honey.....	Somersw'th.	144.0	118.10	Not true to formula.
Pure California	Manchester.	+17.0	—26.4	Contains added cane sugar.
Honey (Compound)	Manchester.	+83.6	+15.4	Mainly glucose and cane sugar.
Cal. Honey; compound 50% Honey, 50% Glucose	Claremont..	131.0	127.6	Illegal labelling; not true to formula.
Wild Rose.....	Concord	+8.0	+2.64	Adulterated with glucose.

SULPHURED HOPS AND THEIR RELATION TO THE COMPOSITION OF MALT LIQUORS.

So far as we have been able to observe, none of the malt liquors on sale in this state are entirely free from a certain amount of contamination by sulphurous acid. In spite of the positive assertions made by certain brewers that they use no preservatives whatever, we have nevertheless found appreciable quantities of this compound in their products.

It has been the custom with chemists to ignore the presence of small quantities of sulphurous acid in beer, indications of this compound as obtained by the test usually employed being attributed rather to the presence of certain impurities other than sulphurous acid. But we have yet to find a liquor of this description the distillate from which, when oxidized in the usual manner, did not show unmistakably the presence of sulphuric acid.

It is evident that such accidental presence of sulphurous acid may arise from two distinct sources: (a) in liquors brewed wholly or in part from glucose the latter compound, as at present occurring on the market, will impart appreciable quantities of this acid to the product (see page 150) (b) true malt liquors may be extensively contaminated by the use of sulphured hops. This sulphuring treatment, now very commonly followed, serves the two-fold purpose of improving the color of brown hops and preventing certain fermentative processes whereby valerianic acid and other disagreeable smelling products would be formed.

From the following analyses, made of samples kindly supplied by a leading Eastern jobber of hops, it is evident that most of this product now on the market contains very large quantities of sulphurous acid. A notable exception is to be found in the New York sample, which, though of excellent quality, contained no trace of this acid.

PER CENT. OF SULPHUROUS ACID IN HOPS.

Oregon, crop of 1905	0.2176
California, crop of 1905	0.3264
Washington, crop of 1905	0.2112
New York, crop of 1905	0.0000
Bavaria, crop of 1905	0.2368
Bohemia, crop of 1905	0.2304
Old pressed hops	0.0700
Old loose hops, Massachusetts	0.0576

ICE-CREAM.

Much variation in quality is manifest in the ice-cream sold by different dealers. Thus it may be prepared exclusively from cream, sugar and flavoring material (the best grade), or eggs, starch, gelatine, gums or other thickening agents may be employed in conjunction therewith, with a corresponding reduction in the proportion of cream used.

In contents of butter fat the samples examined varied widely, the extremes being 5 per cent. and 21 per cent. The U. S. Department of Agriculture's standard for ice-cream, and that also adopted by several states, requires a minimum butter fat content of 14 per cent.

A number of samples examined contained gelatine, though well up in fat. A similar circumstance was noted in the case of goods of the Jersey Ice Cream Co. of Lawrence, Mass., this cream showing the presence of a small amount of some vegetable gum; the manufacturers write that they use gum tragacanth in quantity less than three per cent. for the purpose of preventing shrinkage. In the absence of any ruling on the subject of the use of thickeners in ice-cream otherwise of standard quality, none of these goods were classed as adulterated.

The following samples were found to be low in fat content:

Collected at	Per cent. butter fat.	Gelatine.	Starch.	Preservatives.
Franklin	5.0	None	Present	None.
Franklin	6.0	None	None	None.
Franklin	6.0	None	Present	None.
Franklin		None	Present	None.
Franklin	13.0	None	None	None.
Rochester	11 0	None	None	None.
Dover	10.0	Present	None	None.
Dover	10.0	Present	None	None.
Dover	12.0	Present	None	None.
Dover	11.5	Present	None	None.
Dover	12.0	Present	None	None.
Manchester	11.5	Present	None	None.
Concord	10.0	Much	None	None.
Concord	8.0	None	None	None.

LEMON EXTRACTS.

Ninety-four samples were examined, of which seventy-three were found to be adulterated. A few of the latter were so classed because of deficiency in content of lemon oil or because artificially colored. A very large proportion, however represents extracts prepared from citral.

True lemon oil contains about ninety per cent. of terpenes, chiefly of the variety known as limonene. To these the agreeable odor and flavor of this oil are principally due. However, as the terpenes require comparatively strong alcohol for their solution, and as the latter is the most expensive constituent of a pure extract, many attempts have been made to have the so-called citral extracts accepted as standard. Citral is an aldehyde constituting about seven per cent. of lemon oil, is soluble in dilute alcohol, and is obtained both by the "washing out" of the pure oil and also artificially by the oxidation of geraniol with chromic acid. In spite of representations now being made by certain importers of essential oils that the citral extracts are superior, that it is actually advantageous to get rid of the "worthless," insoluble terpenes, and that nothing but "hide-bound conservatism" is at the bottom of regulations requiring the use of pure oil, there can be no denying that such arguments are all in the interests of increased profits and that in point of flavoring qualities these extracts are distinctly inferior to those conforming to the pharmacopœial standard.

LEMON EXTRACTS FOUND ADULTERATED.

Brand.	Manufacturer.	Per Ct. Lemon Oil.	Per Ct. Alcohol.	Remarks.
Extract Lemon...	So. Salem Phar., So. Salem, Mass...	3.50	84.60	Below standard.
Extract Lemon...	Dr. J. P. Roulier, Salem, Mass.....	.56	78.55	Below standard; colored.
Extract Lemon...	W. M. Cranford, Stafford Springs, Conn.	4.75	72.85	Below standard; colored with turmeric.
Extract Lemon...	J. H. Folkins & Co., Boston, Mass..	1.60	72.77	Below standard; colored.
Conc. Extract Lemon.	.....	0.0	14.15	Colored and artificial.
Extract Lemon...	Victor Mfg. Co., Hartford, Conn....	0.0	16.10	Colored and artificial.
Drive Brand.....	The H. W. Spurr Specialty Co., Boston.	2.25	75.08	Colored and below standard.
Conc. Extract Lemon.	Bell Chem. Co., Portland, Me.....	0.0	48.65	Colored and artificial.
Pure Lemon.....	Thomas Wood, Boston.....	2.47	87.62	Below standard.
"OUR" Lemon..	The Portland Flavoring Co., Portland, Me.	0.0	54.43	Colored and artificial.
Extract Lemon...	Loverin & Shurtleff, Nashua.....	1.35	70.35	Much below standard.
Extract Lemon...	F. H. Stevens, Colebrook.....	1.94	83.60	Much below standard.
Extract Lemon...	.....	4.86	89.70	Slightly below standard.
Green Mountain..	Kimball Bros., Enosburg Falls, Vt.	.60	66.25	Below standard.
Extract Lemon..,	J. Smith Brockway, Boston.....	0.0	47.18	Entirely artificial.
Blue Seal.....	The Blue Seal Ext. Co., Littleton...	1.65	77.64	Much below standard.
Vionana.....	Vionana Specialty Co., Boston.... .	4.00	85.00	Slightly below standard.
Queen City	Burlington Extract Co., Burlington, Vt.	0.0	36.70	Colored and artificial.
Extract Lemon...	.....	4.88	89.99	Slightly below standard.
"OUR" Lemon..	Portland Flavoring Co., Portland..	0.0	.42	Artificial; colored.
Mfr. from pure oil	J. Smith Brockway, Boston.....	0.0	.33	Artificial; colored.
.....	Rockland Ext. Co., Rockland, Me..	2.0	.73	Below standard.
Highly Concentrated.	Van Duzer & Co., New York.....	3.6	.88	Below standard.
Good Value	Good Value Ext. Co., New York....	0.0	.45	Artificial; colored.
St. John's.....	St. John & Co., New York.....	0.0	.34	Artificial; colored.
Pure Extract of Lemon.	.....	4.0	.84	Below standard; colored.
Hall's High Grade.	Hall Extract Co., Portland.....	4 8	.85	Slightly below standard.
Genuine Extract Lemon.	R. T. French & Co., Rochester, N. Y.	0.0	.35	Artificial.
Globe	Potter & Wrightington, Boston.....	4.7	.81	Below standard; colored.
Parker's 10-Cent.	C. L. Cotton Co., Elizabeth, N. J....	0.0	.20	Artificial.
Pure Extract.....	....	7.1	.89	Contains added color.
Pure Extract.....	....	0.0	.53	Artificial.
Finest True Fruit	.....	14.1	.93	Contains added color.
Pure Conc. Ext...	.....	0.6	.59	Artificial.
Extract Lemon...	Cal. Perfume Co., New York.....	2.03	79.95	Colored; below standard.
Red Seal.....	Red Seal Co.....	1.03	73.30	Colored; below standard.
Empire State...	....	0.0	20.71	Artificial.

LEMON EXTRACTS FOUND ADULTERATED.—*Concluded.*

Brand.	Manufacturer.	Per Ct. Lemon Oil.	Per Ct. Alcohol.	Remarks.
O. K. Lemonine..	C. L. Cotton Perfume and Ext. Co., Earlville, N. Y.	0.0	38.81	Colored and artificial.
Gem Conc. Ext...	George A. Moss, New York.....	0.0	.....	Colored and artificial.
Golden Cap.....	Tremont Extract Co.....	0.0	56.54	Colored and artificial.
Red Cross.....	Sage Bros., Boston.....	0.0	29.78	Colored and artificial.
Essence Lemon..	F. B. Marsh, Providence, R. I.....	0.0	57.25	Artificial.
Lemon Extract...	Casco Extract Co., Hartford, Conn.	0.0	35.77	Colored and artificial.
Lemon Extract...	Geneva Mfg. Co., Boston.....	0.0	23.10	Colored and artificial.
Lemon Extract...	....	0.0	.....	Colored and artificial.
Lemon Extract...	Slater Ext. Co., Pawtucket, R. I.....	0.0	44.18	Artificial.
Lemon Extract...	Kimball Bros., Enosburg Falls, Vt.	3.12	80.60	Colored; below standard.
Phœnix Brand...	Falcon Pack. Co., New York.....	.91	65.21	Colored; below standard.
Ragus Ext. Lem.	Ragus Tea & Coffee Co., New York	.91	62.07	Colored; below standard.
Cal. Conc. Extract Lemon.	Cal. Perfume Co., New York.....	2.03	74.33	Colored; below standard.
Lemon Extract...	Eureka Mfg. Co., Hartford, Conn..	0.0	32.58	Colored; below standard.
Bliss Standard ...	The Bliss Ext. Co., Salem, Mass....	0.0	32.98	Colored; below standard.
Pure Extract.....	Rigby Ext. Co., Portland, Me.....	1.80	.....	Below standard.
Bliss Standard ...	The Bliss Ext. Co., Salem, Mass....	0.0	32.98	Colored; below standard.
Extract Lemon...	J. H. Folkins & Co., Boston.....	1.80	66.90	Colored; below standard.
Cook's.....	E. E. Cook, Boston.....	78.33	3.29	Below standard.
Forest City.....	Forest City Extract Co., Portland, Me.	45.77	0.53	Colored sub. for genuine.
Lemon	White & Co., Boston.....	61.49	0.53	Colored sub. for genuine.
Lemon.....	W. L. Goodnow Co., Keene.....	75.87	1.00	Low grade.
T. W. R. Bradford's.	Lehealol Prep. Co., Melrose, Mass..	22.55	0.0	Colored sub. for genuine.
Kimball's.....	Kimball Bros. & Co., Enosburg Falls, Vt.	83.85	4.12	Below standard; illegally colored.
Compound.....	Lea & Herrick, Saratoga Springs, N. Y.	58.85	0.50	Colored sub. for genuine.
Superior.....	New York Extract Co.....	59.68	0.20	Colored sub. for genuine.
Concentrated	No name given.....	15.49	0.00	Colored sub. for genuine.
Bastine's.....	Bastine & Co., New York.....	79.79	2.00	Below standard; illegally colored.
Compound.....	Victor Mfg. Co., Hartford, Conn....	.....	0.00	Colored sub. for genuine.
Good Value	—— Binghampton, N. Y.....	45.89	trace	Colored sub. for genuine.
Red Cross.....	No name given.....	27.49	trace	Colored sub. for genuine.
Charter Oak.....	Charter Oak Extract Co., Hartford, Conn.	.....	5.00	Illegally colored.
Lemon.....	Casco Extract Co., Hartford, Conn.	59.47	0.00	Colored sub. for genuine.
Climax.....	No name given.....	38.00	0.30	Colored sub. for genuine.
Perfection.....	Martin L. Hall, Boston.....	24.00	0.37	Colored sub. for genuine.

MAPLE PRODUCTS.

One hundred and fifty-four samples of maple products have been examined during the past two years. Of these, ninety-eight were found to be adulterated with cane syrup. Many of these goods purported, on close examination of the package, to be compounds, but it was nothing unusual to find them labeled "Strictly Pure Maple Syrup" in large type and with the word "compound" or a formula in small type, the latter not infrequently being found on the back of the package. The stringent law recently enacted relative to the adulteration of maple products has had a most beneficial effect, however, and it may be stated that during the past year it has been a comparatively difficult matter to find any adulterated goods being offered.

It should be understood that the use of the words "maple sugar" or "maple syrup" in the title, or of any design suggestive of maple sugar or syrup on the label affixed to goods not exclusively the product of the sugar maple, is expressly forbidden.

In this connection the following article prepared by Mr. H. E. Barnard, formerly chemist to the Board of Health, is reproduced from the January, 1905, issue of the *Bulletin:*

Certain varieties of the maple, notably *Acer saccharinum*, or *Acer barbatum*, produce sap which possesses marked saccharine properties, and which is largely employed in the production of maple syrup and sugar. "The bulk of this commodity is made in six states, Vermont, New York, Michigan, Pennsylvania and New Hampshire, named in the order of their output. These states furnish 95 per cent. of the sugar and over 80 per cent. of the syrup. The average annual maple sugar crop of the United States approximates 45,000,000 pounds. The census data shows variations from below 30,000,000 pounds (1899) to nearly 53,000,000 pounds (1853). The money value of the 1899 crop, which was below the average, is placed by the last census returns at $2,636,711."[1] In the last few years the annual output has been diminished, both by meteorological conditions and by the ravages of the forest tent caterpillar in the eastern states, so that at present the demand for maple products exceeds the output and has forced up the value of the crop.

These products possess, besides the sweetness due to the sucrose and reducing sugars, a very agreeable and delicate flavor imparted by minor constituents of the sap, which gives to maple sugar and syrup a value much in excess of its worth as a mere sweetening agent. A demand for the products of the maple because of their peculiarly inviting flavor has created an industry which, during the latter part of February and the month of March, affords the agricultural population a lucrative and agreeable occupation. The market for pure goods of high quality is so great that it would be a profitable undertaking for our farmers to increase their output to the maximum.

But, unfortunately for the producer and the consumer alike the high price of maple products has stimulated the manufacture of artificial syrups and sugars from cane sugar and glucose, flavored with decoctions of hickory bark and colored with caramel, until at the present time it is impossible to buy with any certainty pure maple syrups or sugars, even in the season of their production.

[1] The Maple Sap Flow, Vt. Ex. Sta., Bull. No. 103.

It is safe to assert that if every farmer in New Hampshire had a sugar orchard and marketed each year all the syrup he could produce, the combined output would be far below the quantity annually sold on our markets as "pure maple syrup."

During the spring months much pure syrup is sold, usually in the well-known tin can package, but, as the producer always endeavors to dispose of his output at once, soon after production ceases all the season's crop is in the hands of jobbers and bottlers. It is the custom of the manufacturer of food products to contract annually for large amounts of sugar or syrup, usually the sugar, because of greater ease in handling and less cost, to be worked up as needed for his trade. The bulk of maple syrup is probably made by remelting maple sugar, and manufacturers and jobbers, when called upon to defend the inferior quality of their goods, seek refuge in the plea that they supposed they were buying pure sugar, and insist that they are not responsible if their syrups prove to be 75 per cent. cane sugar. It cannot be, however, the duty of the chemist to consider syrup a maple syrup because it purports to be made from maple sugar, and the manufacturer must protect himself by knowing the quality of the goods he purchases.

The composition of maple sugar is so much like cane sugar that both chemists and the public have for a long time harbored the delusion that it was impossible to discriminate between genuine and artificially prepared sugars, and the trade has made good use of this lack of knowledge of the composition of maple products, and has labeled the most fraudulent goods "Pure Maple," secure in the belief that it was impossible to detect the deceit. But the researches of Jones and Hortvet have thrown a new light on the composition of maple sap and sugars, and their methods, based on the quantity of ash, volume of precipitate with lead subacetate, alkalinity of ash, and other data, now afford us accurate and satisfactory methods of analysis.

The government definition of maple sugar is as follows: "Maple sugar is the solid product resulting from the evaporation of maple sap," and of maple syrup: "Maple syrup is a syrup obtained by the evaporation of maple sap, or the solution of maple concrete." The standard and definition in force in this state is as follows: "Maple syrup and sugar must be true to name. The chief element of value in maple syrup and sugar is the maple flavor, and any admixture of other sugars is an adulteration."

And yet, although by general understanding and these specific definitions the trade has been well informed as to what constituted a pure syrup and sugar, the foregoing table illustrates in a striking way how little the manufacturer cares for the truth when he labels his products. "Guaranteed Strictly Pure," "Warranted Pure," "Pure Fancy Vermont Maple," "High Grade," "Preferred Stock," are all found on goods of the poorest quality and mean nothing, even when associated with the name of reputable houses. A striking example of the double meaning label, intended to deceive the purchaser and to make the article saleable in states having a "Compound Law," as well, is that afforded by the syrup, No. 1405, made by the J. T. Pillman Preserving Co., Ayer, Mass., and labeled "Pillman's Perfection Brand Maple Syrup, Warranted Strictly Pure," in clear and prominent letters, and at the same time having at the very bottom of the label, in letters less than one-eighth inch high, this qualifying statement, "Strictly Pure Vermont Maple and Granulated Sugar." Other adulterated syrups have the "Strictly Pure" clause on the front of the bottle and a compound formula on the back. The trade must understand that, in New Hampshire, maple syrup and sugar offered for sale must conform to our standard, and that any substitute *for maple* products, if sold as maple, will be an adulteration prohibited by statute.

RESULTS OF ANALYSES SHOWING ADULTERATED MAPLE SUGAR AND SYRUP.

Brand.	Manufacturer.	Remarks.
Maple Syrup	Maple Grove Sugar Co., Manchester	Made from cane sugar.
Sap Syrup	F. Whitcher, Marshfield, Vt.	Dilute syrup, larely cane sug.
Maple Syrup	J. T. Pillman & Co., Ayer, Mass.	Largely cane sugar.
Maple Syrup	Falcon Packing Co., New York	Largely cane sugar.
Vermont Maple Syrup	Ayer Preserving Co., Ayer, Mass.	Largely cane sugar.
Maple Syrup	J. T. Pillman & Co., Ayer, Mass.	Largely cane sugar.
Vermont Maple Syrup	Maple Grove Sugar Co., Manchester	Largely cane sugar.
Maple Syrup	Geo. Mailhot, Manchester	Cane sugar and glucose.
Cream Maple Sugar	Fournier & Schiller Co., Central Falls, R. I.	Made of cane sugar and glucose.
Maple Sugar Cream	Riverside Preserving Co., Lowell, Mass.	Adulterated with brown sugar.
Spindle City	Mansfield, Witham Co, Lowell, Mass.	Adulterated with cane sugar.
Maple Syrup	Not known	Adulterated with cane sugar.
Maple Syrup	Not known	Adulterated with cane sugar.
Champion Brand	C. A. Reed, Medford, Mass.	Adulterated with cane sugar.
Moody's Matchless	Chas. E. Moody & Co., Boston	Adulterated with cane sugar.
Guaranteed Pure Fancy Vermont	Haskell, Adams & Co., Boston	Almost entirely cane sugar.
Golden Tree Pure Maple Syrup	N. E. Maple Syrup Co., Boston	Almost entirely cane sugar.
Pure Maple Syrup	C. A. Reed, Medford, Mass.	Largely cane sugar.
American Beauty, Strictly Pure	Fournier & Schiller Co., Central Falls, R. I.	Largely cane sugar.
Vermont Maple Syrup	Maple Grove Sugar Co., Manchester	Almost entirely cane sugar.
Canada Brand, Strictly Pure	T. Roux & Co., Manchester	Largely cane sugar.
Canada Brand, Strictly Pure	T. Roux & Co., Manchester	Largely cane sugar.
Victor Brand Pure Maple Sap Syrup	Simpson Spring Co., South Easton, Mass.	Largely cane sugar.
Pillman's Perfection Maple Syrup, Pure	J. T. Pillman Preserving Co., Ayer, Mass.	Largely cane sugar.
American Beauty, Strictly Pure	Fournier & Schiller Co., Central Falls, R. I.	Largely cane sugar.
Vermont Soft Sugar	Fournier & Schiller Co., Central Falls, R. I.	Mixture glucose and cane sug.
High Grade Maple Cream	Riverside Preserving Co., Lowell, Mass.	Largely cane sugar.
Cream Maple Sugar	Fournier & Schiller Co., Central Falls, R. I.	Mixture glucose and cane sug.
Maple Sugar	T. Roux, Manchester	Cane sugar col. with caramel.
Canada Maple Sugar	T. Roux, Manchester	Largely cane sugar.
Maple Syrup		Contains 35.64% glucose.
Maple Syrup		Contains 28.56% glucose.
Pref. St'ck Warranted Strictly Pure Vt. Maple Syrup	M. L. Hall & Co., Boston	Almost entirely cane sugar.
Whitcher's Fancy Vt. Syrup	Ayer Preserving Co., Ayer, Mass.	Almost entirely cane sugar.
Pure Maple Syrup	W. A. Little & Co., Boston	Largely cane sugar.
Merrimac Pure Vt. Maple Syrup	Riverside Preserving Co., Lowell, Mass.	Largely cane sugar.
Vt. Maple Syrup, Warranted Pure	Vermont Syrup Co., Stowe, Vt.	Largely cane sugar.
Maple Syrup	E. T. Cowdrey Co., Boston	Largely cane sugar.

MAPLE SYRUP AND SUGAR.—*Continued.*

Brand.	Manufacturer.	Remarks.
Hazen's Vt. Maple Syrup, Warranted	.....	Largely cane sugar syrup.
Vt. Maple Syrup, Warranted Strictly Pure	Ayer Preserving Co., Ayer, Mass.	Cane sugar syrup.
Pure Quebec, Quality Unsurpassed	Williams Bros. & Charbonneau, Detroit, Mich.	Largely cane sugar syrup.
Manhattan Club Pure Maple Syrup	J. H. Folkins Co., Boston.....	Largely cane sugar syrup.
Pure Vermont Maple Syrup...	Franklin Co., Vermont.....	Largely cane sugar syrup.
Maple Syrup.....	N. E. Maple Syrup Co., Boston	Largely cane sugar syrup.
Pure Vermont Maple Syrup...	Milliken, Tomlinson Co., Portland, Me.	Largely cane sugar syrup.
Moody's "Matchless" Maple Syrup	C. E. Moody & Co., Boston....	50% cane sugar.
Maple Sugar.....	....	Entirely cane sugar; colored.
Maple Sugar.....	.....	Entirely cane sugar; colored.
Maple Sugar Cakes.....	....	Cane sugar col. with caramel.
Maple Sugar Cakes.....	W. J. Lamb, Somerville, Mass.	Cane sugar col. with caramel.
Maple Sugar Cakes.....	.....	Cane sugar col. with caramel.
Maple Sugar Cakes.....	.....	Glucose, 8.03%. No maple sugar present.
Maple Sugar Cakes.....	.....	Cane sugar col. with caramel.
Maple Sugar Cakes.....	.....	Cane sugar col. with caramel.
Monarch Maple Syrup.	B. F. Leighton, Haverhill, Mass.	Largely cane sugar syrup.
Victor Brand Maple Syrup....	Simpson Spring Co., South Easton, Mass.	Largely cane sugar syrup.
Merrimack Maple Syrup	Riverside Preserving Co., Lowell, Mass.	Cane sugar syrup colored with caramel.
Old Homestead Maple Syrup..	Falcon Packing Co., New York	Cane sugar syrup colored with caramel.
Green Mt. Maple Syrup.....	W. J. Lamb, Somerville, Mass.	Cane sugar syrup colored with caramel.
Metropolitan Maple Syrup....	J. H. Folkins & Co., Boston....	Cane sugar syrup colored with caramel.
Stella Maple Syrup.....	Chas. Lawrence & Co., Boston	Cane sugar syrup colored with caramel.
Maple Syrup.....	.....	Largely cane sugar syrup.
Vermont Maple Syrup.....	Mansfield, Witham & Co., Lowell, Mass.	Largely cane sugar syrup.
Manhattan Club Maple Syrup.	J. H. Folkins & Co., Boston....	Largely cane sugar syrup.
Pure Maple Syrup.....	E. D. Pettingill & Co., Portland, Me.	Largely cane sugar syrup.
Vermont Maple Syrup.....	W. A. Little & Co., Boston	Cane sugar syrup colored with caramel.
Choice Maple Syrup.....	Waterbury, Vt.....	Cane sugar syrup colored with caramel.
Perfection Maple Syrup.....	J. A. Pillman & Co., Ayer, Mass.	Cane sugar syrup colored with caramel.
Vermont Maple Syrup....	E. E. Clifford & Co., Portland, Me.	Cane sugar syrup colored with caramel.
Table Maple Syrup.....	.....	Glucose, 23.56%; artificial.
Mt. Kineo Maple Syrup.....	Shaw, Hammond & Carney, Portland, Me.	Cane sugar syrup colored with caramel.
Maple Sugar Cakes.....	.....	Made from cane sugar.
Maple Sugar Cakes..... ...	.....	Adulterated with cane sugar.
Strictly Pure Vt. Maple Syrup	N. E. Maple Syrup Co., Boston	Mainly cane syrup.
Pure Maple Syrup.....	C. A. Reed, Medford, Mass....	Largely cane syrup.
Victor Maple Sap Syrup.....	Simpson Spring Co., South Easton, Mass.	Largely cane syrup.

MAPLE SYRUP AND SUGAR.—*Concluded.*

Brand.	Manufacturer.	Remarks.
Red Cross Pure Maple Syrup..	H. S. Melcher & Co., Portland, Me.	Mainly cane syrup.
Stella Brand Pure Maple Syrup	Chas. Lawrence & Co., Boston	Mainly cane syrup.
Whitcher's Vt. Maple Syrup..	Ayer Preserving Co., Ayer, Mass.	Entirely cane syrup.
Maple Syrup.....	F. H. Wheeler, Proctorsville, Vt.	Adulterated with cane sugar.
Guaranteed Pure Maple Syrup	W. A. Little & Co., Boston.....	Almost wholly cane syrup.
[1] Berkshire Brand MapleSyrup	Simpson Spring Co., South Easton, Mass.	Illegally labelled; not true to formula.
Metropolitan Maple Syrup....	J. H. Folkins Co , Boston.....	Largely cane syrup.
[2] Pure Maple Syrup.....	Fornier & Schiller, Central Falls, R. I.	Illegally labelled.
[3] Maple Syrup.....	——, Waterbury, Vt.....	Mainly cane syrup; illegally labelled.
Extra Quality Pure Maple Syrup	W. J. Lamb, Somerville, Mass.	Adulterated with cane syrup.
[4] Strictly Pure Vermont Maple Sap Syrup	Frank Whitcher, Marshfield, Vt.	Entirely cane syrup.
[5] Solar Brand Extra Quality Maple Syrup	C. A. Weston Co., Portland, Me.	Illegally labelled; not true to formula.
[3] Victor Brand Maple Syrup...	Simpson Spring Co., South Easton, Mass.	Illegally labelled.
Manhattan Club Pure Maple Syrup	J. H. Folkins Co., Boston.....	Largely cane syrup.
Manhattan Club Pure Maple Syrup	J. H. Folkins Co., Boston.....	Largely cane syrup.
White Daisy Fancy Vt. Syrup.	Ayer Preserving Co.., Ayer, Mass.	Not true to formula.
Maple Sugar...	W. J. Lamb, Somerville, Mass.	Adulterated with cane sugar.
Maple Sugar.....	W. J. Lamb, Somerville, Mass.	Adulterated with cane sugar.
[7] Maple Sugar in round cakes.	.....	Not true to formula.
[6] Maple Sugar in round cakes.	....	Half cane sugar.
Maple Sugar in round cakes..	....	Mainly cane sugar.

[1] Formula: 40 per cent. maple, 60 per cent. cane. Incorrect.
[2] Formula: 80 per cent. refined sugar, 20 per cent. cane sugar.
[3] No formula; label bears statement in fine type: "Made from maple sugar and cane sugar."
[4] Claims (on back of package) "strictly pure maple and cane sugar."
[5] Statement on back of package: "We guarantee these goods to be free from any glucose or cane syrup and to be made from half pure maple and half white sugar." Guarantee is not substantiated.
[6] Properly labelled but not true to formula; latter calls for 40 per cent. maple.
[7] Box marked "Compound, 50 per cent. maple, 50 per cent. cane." Formula is incorrect.
[8] Formula claiming 60 per cent. maple sugar, not sustained by analysis.

MALT EXTRACTS.

That the above might properly also be classed under the head of beverages is attested by the fact that most of such differ in no very important essential from ordinary beer, and therefore find an extensive sale for other than "tonic" purposes.

A true malt extract is a heavy, syrupy fluid approaching the consistency of glucose, prepared by concentrating an aqueous extract of malt under diminished atmospheric pressure. Such an extract should contain over seventy per cent. of solid matter, the latter consisting mainly of maltose or malt sugar, together with a certain percentage of nitrogenous bodies, and, if carefully prepared, a small amount of an enzymic ferment known as malt diastase. The latter is supposed to possess a certain dietetic value, because of the property this body has of converting the starches into sugar. It is claimed that true malt extract contains no alcohol; however, the latter was found in both the samples examined.

Ordinary so-called "malt extract," on the other hand, is in the nature of a heavy beer approaching somewhat in character that of porter. As no diastatic power was detected in the case of any of the samples examined, any tonic properties possessed by these preparations must be nearly identical with those of ordinary beer.

It may be stated that two of the brands examined were of distinctly different character from the others, although sold at the same average price. In view of the composition of these preparations, it would seem that the latter is unreasonably high in some instances, notably in the case of the imported brands.

RESULTS OF EXAMINATION OF MALT EXTRACTS.

Brand.	Manufacturer.	Price per bottle.	Alcohol per cent. by vol.	Solids per cent.	Remarks.
Leicester's English	Massachusetts Brewing Co	.....	6.05	8.22	
Wyeth's	John Wyeth & Bro., Philadelphia	$0.25	2.10	14.91	
Johann Hoff's	Eisner & Mendelson Co., New York, agents.	0.30	5.35	8.32	
Pabst's	Pabst Brewing Co., Milwaukee	0.25	6.15	8.53	
Malt Nutrine	Anheuser Busch Brewing Co	0.25	2.08	14.36	Preserved with salicylic acid.
Miller's Best	Miller Brewing Co., Milwaukee	0.25	5.45	8.91	
Wampole's	H. K. Wampole, Philadelphia	0.25	9.30	12.55	Preserved with salicylic acid.
King's Pure Malt	King's, 73 Conant St., Boston	0.20	6.15	8.80	
Bavarian	Clark & Roberts, Boston, agents	0.15	4.50	7.48	
Schultz's	Schultz's Malt Extract Co., New York.	0.15	4.55	6.21	
Leopold Hoff	Tarrant & Co., New York, agents	0.30	7.75	9.88	
Noyes' (Tarrant's)*	P. J. Noyes & Co., Lancaster	.....	5.04	9.57	
Teutonic	S. Lieberman & Son's Brewing Co	0.20	8.07	9.10	
Weir's Red Cross	Pioneer Malt Extract Co., New York	.....	4.98	7.12	
Harris' "Herculine."	Albert H. Harris, New York	0.15	4.21	6.44	
Noris	Noris Malt Co., Boston	0.25	4.79	8.88	
Mulford's	H. K. Mulford Co., Philadelphia.	0.25	7.15	8.43	
Braunschweiger Mumme.	Long Island Bottling Co	0.15†	5.60	9.97	Preserved with salicylic acid.
Braunschweiger Mumme.	Long Island Bottling Co	0.15†	6.05	11.20	Preserved with salicylic acid.
Menzel's	Menzel Malt Co., Boston	0.15	4.81	5.25	
Canada	Martin L. Hall & Co., Boston	.....	4.45	6.47	
Maltine	Maltine Mfg. Co., New York	1.00	1.95‡	70.00	
Trommer's	Trommer Co., Tremont, Ohio	1.00	1.84‡	70.50	

* Misleadingly recommended by the proprietors "as a substitute for ale, beer, porter, and every description of alcoholic drinks, all of which are more stimulating than nourishing, while the reverse is true of this, the only imported malt extract." Also represented as being "a safe and efficacious remedy in disorders of the throat, lungs, chest and stomach, such as sore throat, hoarseness, coughs, colds, consumption, dyspepsia, catarrh of the stomach, etc.!"

† Two for 25 cents.

‡ Per cent. by weight.

MEAT PRODUCTS AND FISH.

One hundred and forty-seven samples of this class were examined, seventy-four of which were found to be adulterated. The examinations made were for antiseptics and added coloring matter, the degree of preservation being also noted. Certain of these preparations are said to contain corn meal, added, it is claimed by the manufacturers, for the purpose of keeping the goods in proper condition. According to a recent ruling made under the provisions of the federal Food and Drug Act, the use of such is permissible in the case of meat "loaves."

MEAT PRODUCTS AND FISH FOUND ADULTERATED.

Brand.	Manufacturer.	Where Collected.	Preservative.
Sausage	Niles & Ointhank	Dover	Borax.
Sausage		Dover	Borax.
Frankfurter	Oscar Schöninger, Manchester	Manchester.	Borax.
German Sausage	Oscar Schöninger, Manchester	Manchester.	Borax.
Hamburger Steak	Huntley & Coaker, Boston	Manchester.	Sodium sulphite
Sausage	Adeland Lemay, Manchester.	Manchester	Borax.
Hamburger Steak	Wheeler and Chamberlain, Boston.	Manchester.	Sodium sulphite
Bologna Sausage		Concord	Borax.
Pressed Ham		Concord	Borax.
Pickled Tripe		Concord	Borax.
Frankfurter Sausage		Concord	Borax.
Sausage		Concord	Borax.
Sausage		Concord	Borax.
Pressed Ham	Wm. F. Schonland, Manchester	Concord	Borax.
Fresh Tripe		Concord	Borax.
Sausage		Franklin F's	Borax.
Stripped Codfish, Opal Brand.	Cunningham & Thompson, Gloucester, Mass.	Franklin F's	Borax.
Head Cheese		Franklin F's	Borax.
Sausage	Oscar Schonland, Manchester	Penacook	Borax.
Hamburger Steak	Chamberlain & Co., Boston, Mass.	Portsmouth.	Sodium sulphite
Pork Trimmings		Manchester.	Borax.
Cheek Meat		Manchester.	Borax.
Sausage		Concord	Borax.
Sausage		Newmarket.	Borax.
Frankfurter		Newmarket.	Borax.
Frankfurter		Newmarket.	Borax.
Pressed Ham	J. M. Wilson	Newmarket.	Borax.
Tripe		Dover	Borax.
Tripe		Dover	Borax.
Frankfurter		Dover	Borax.
Large Sausage	Eastern Pack. Co., Boston	Dover	Borax.
Frankfurter		Dover	Borax.
Small Sausage		Concord	Borax.
Small Sausage		Rochester	Borax.
Frankfurter		Rochester	Borax.
Fresh Tripe	Adams, Chaplin & Co., Boston	Rochester	Borax.
Hamburger Steak	Wheeler & Chamberlain, Boston.	Dover	Sulphites.

MEAT PRODUCTS AND FISH FOUND ADULTERATED.—*Concluded.*

Brand.	Manufacturer.	Where Collected.	Preservative.
Hamburger Steak	T. H. Wheeler & Co., Boston	Somersw'th.	Sulphites.
Hamburger Steak	T. H. Wheeler & Co., Boston	Dover	Sulphites.
Pressed Ham		Somersw'th.	Borax.
Lamb's Tongues	G. D. Brown & Co., Boston	Dover	Borax.
Frankfurter		Concord	Borax.
Pressed Ham		Concord	Borax.
Pickled Tripe		Concord	Borax.
Frankfurter		Concord	Borax.
Frankfurter		Concord	Borax.
Pickled Tripe		Concord	Borax.
Frankfurter		Concord	Borax.
Bologna		Concord	Borax.
Frankfurter		Concord	Borax.
Pressed Ham		Concord	Borax.
Frankfurter		Concord	Borax.
Bologna		Concord	Borax.
Pressed Ham		Concord	Borax.
Frankfurter		Concord	Borax.
Bologna		Concord	Borax.
Frankfurter		Concord	Borax.
Frankfurter		Concord	Borax.
Pressed Ham		Berlin	Borax.
Bologna		Berlin	Borax.
Pressed Ham	E. W. Penley, Auburn, Me.	Berlin	Borax.
Minced Ham	E. W. Penley, Auburn, Me.	Lancaster	Borax.
Fresh Tripe		Lancaster	Borax.
Frankfurter	E. W. Penley, Auburn, Me.	Colebrook	Borax.
Minced Ham		Berlin	Borax.
Pressed Ham		Colebrook	Borax.
Sliced Boiled Ham	Beech-Nut Pack. Co., Canajoharie, N. Y.	Whitefield	Borax.
Sausage		Manchester.	Sulphites.
Georges Boneless Codfish	Lord Bros., Portland	No. Conway	Borax.
Frankfurter	Bachelor & Co., Boston	Nashua	Borax.
Pressed Ham		Nashua	Borax.
Hamburger		Nashua	Sulphites.
Swans Down Pre. Codfish	Packed at Gloucester	Nashua	Borax.
Tag Brand Codfish	W. H. Lord, Dedham, Mass.	Concord	Borax.

MILK.

During the period 129 samples of milk were analyzed. This does not include a number brought in by private parties of which a microscopical examination only was made. Of the above number a majority were collected from the larger towns by the local health officers at the direct request of this department.

While in Massachusetts a statutory provision requires that a certain large share of the appropriation available for food inspection shall be devoted to the inspection of the milk supply, the examination of the latter at this laboratory has never become an important feature of the work. So far as this food is concerned New Hampshire is a state of production rather than of consumption, a large proportion of the total product being converted into butter or shipped to Boston, where the quality becomes a matter for the contractors to determine. The City of Manchester has an extensive and most efficient system of milk inspection of its own, and the only samples examined from this city were in cases where this department was asked to act as referee for the local department. The milk supplies of the cities of Concord and Nashua are also subject to municipal inspection.

Of the 129 samples examined forty-two were found to be below standard. But a small proportion of the latter, however, were encountered in the course of regular inspection. Most of these represent milk from special or suspected sources, at least fifty per cent. being furnished by less than a half dozen individual dealers.

The analyses demonstrated that three dealers were guilty of adding water to the milk supplied their patrons. The samples thus watered were received from Keene, Amherst and Goffstown. In one instance the defendant died as the result of an accident before the case was brought to trial. In the other cases no action was brought. In this connection the attention of local boards of health and milk inspectors is called to section 17 of chapter 107, Laws of 1901, which provides that "it shall be the duty of boards of health and milk inspectors to file the necessary information with the chief of police of the city or town, or the county solicitor of the county in which such city or town may be situated, and it shall be the duty of such chief of police and county solicitor to prosecute offenders under this act to final judgment and sentence."

The following table, reproduced from the October, 1906, *Bulletin*, gives a summary of the results obtained in connection with a systematic inspection conducted during the quarter preceding. None of the fifty-nine samples contained preservative or added color.

	Whole number examined.	Number below standard.	Below 13 per cent. solids.	Average per cent. solids.	Average per cent. fat.
Dover.....	12	2	8	13.25	4.79
Rochester.....	11	2	5	13.38	4.61
Keene.....	9	1	3	13.09	4.20
Portsmouth.....	12	3	10	12.44	3.80
Somersworth....	3	2	3	13.07	4.39
Franklin.....	4	0	4	12.58	3.75
Miscellaneous...	4	0	.....	.....	....
Totals.....	59	10	28	13.00	4.25

Thus far the matter of milk inspection at the Laboratory of Hygiene has received the most attention during the summer months, for the reason that this is the period when people are most interested in the quality of the supply. It is evident from the above table, however, that were examinations conducted during the winter months, when the requirement is thirteen per cent of solids, many of the samples here reported as of legal quality would then have to be classed as below standard. A large proportion of the stock owned by New England dairymen is of the Holstein and Ayrshire variety. The former breed is especially liable to furnish milk below the thirteen per cent. requirement, the writer personally having known of cases where the milk of healthy cows of this strain contained less than eleven per cent. of solids. The latter were, of course, extreme instances.

A feature that should undoubtedly receive more attention at the hands of local boards of health than it has in the past, is the inspection relative to the sanitary condition of dairies. It would appear that there is no small room for improvement in the latter respect. The production of the maximum quantity of milk high in fat and solid content is by no means the sole end toward which the dairyman should strive. "Dirty" milk, *i. e.*, milk not drawn under cleanly conditions or properly cooled, is a most prolific cause of intestinal disturbances in infants, and in view of the fact that the latter depend so largely upon this fluid for their sustenance, the vital importance of a supply containing the minimum possible of bacteria and foreign matter cannot be stated too plainly.

A few cases of "ropy" or "stringy" milk have been brought to our attention. This trouble is due to fermentative or decomposition processes caused by certain forms of bacteria. Thorough cleaning of the stable—preferably with whitewashing; avoiding the creation of dust during milking; due cleanliness in the latter operation; and the use only of thor-

oughly cleaned pails, strainer cloths and other utensils are measures that will not only prove effective in combating this trouble, but are absolutely essential to the production of pure milk.

In two or three instances consumers have complained that their milk kept suspiciously well,—that it refused to sour as quickly as they believed pure milk should. In none of these cases, however, was the use of preservatives detected, so it would seem that the circumstance should be regarded rather as a tribute to the cleanliness of the producer. That milk when properly drawn should keep sweet for several days is by no means out of the question. Indeed, as going to show the value of care in this connection, the case may be cited where milk was shipped from Illinois across the Atlantic to the Paris Exposition in 1900, being seventeen days on the journey, and remained good and sweet for three days after its arrival; and this without the use of either heat or preservatives having been resorted to.

Every sample of milk received at the laboratory is uniformly tested for the antiseptics usually employed for chemically preserving milk. That the use of such in New Hampshire cannot be at all common is evident from the fact that not more than a half dozen cases of such have ever been observed at this laboratory. In this connection, the following summary from the report for 1905 of the Massachusetts Board of Health is interesting:

PRESERVATIVES IN MILK.

Year.	Samples examined.	Samples containing formaldehyde.		Samples containing boric acid.		Number containing carbonate.	Total containing preservative.
		Number.	Per cent.	Number.	Per cent.		
1898..... ...	1,046	26	2.5	11	1.0	4	41
1899.....	2,105	55	2.6	13	0.6	3	71
1900.....	2,018	61	3.0	6	0.3	.....	67
1901.....	2,154	42	1.9	12	0.5	.....	54
1902.....	1,934	29	1.5	14	0.7	.....	43
1903.....	1,935	28	1.5	11	0.4	1	40
1904.....	1,863	20	1.1	.....	.....	.....	20
1905.....	532	1	0.2	.....	.....	.....	1
Summary.	13,587	262	1.93	67	0.49	8	337

MOLASSES.

One hundred and ninety-five samples were examined, forty-five of which were found to be adulterated with glucose. Many of the latter came from the northern towns, where there had hitherto been no inspection.

While but very little molasses adulterated with glucose is to be found on sale at the present, nevertheless, we do find that a good deal as now on the market is contaminated with varying quantities of zinc salts and sulphurous acid, used for the purpose of bleaching, and appearing as a residuum from the treatment employed in the manufacture of refined sugar. Investigations are now in progress relative to the extent of this contamination, and in the meantime the local jobbers have promised to use what influence they may possess with the refiners in effecting such modifications in present methods of manufacture as may be necessary to secure pure molasses.

RESULTS OF EXAMINATIONS OF ADULTERATED MOLASSES.

Brand.	Wholesaler.	Where collected.	Remarks. Per cent. composition.
.....	.....	Franklin.....	Sucrose, 34.21; glucose, 7.88.
50c.....	M. L. Hall & Co., Boston.....	Franklin.....	Sucrose, 16.28; glucose, 28.41.
.....	M. S. Ayer, Fitchburg, Mass.....	Franklin.....	Sucrose, 17.92; glucose, 40.04.
45c.....	....	Penacook.....	Sucrose, 1.81; glucose, 50.96.
.....	Shepard Brothers, Franklin.....	Penacook.....	Sucrose, 24.06; glucose, 26.18.
50c.....	Holbrook, Marshall Co., Nashua.	Penacook.....	Sucrose, 24.96; glucose, 22.31.
.....	A. S. Melcher, Portland.....	Portsmouth...	Sucrose, 27.52; glucose, 36.86.
35c.....	D. W. True & Co.....	Rochester ..	Sucrose, 21.66; glucose, 22.86.
.....	.....	Rochester....	Sucrose, 21.36; glucose, 26.16.
.....	Millikin, Tomlinson Co., Portland	Somersworth.	Sucrose, 31.28; glucose, 38.97.
.....	Delano, Potter & Co., Boston.....	Somersworth.	Sucrose 24.81; glucose, 38.97.
.....	Silas Pierce & Co., Boston.....	Somersworth.	Sucrose, 34.73; glucose, 4.73.
50c.....	....	Somersworth.	Sucrose, 28.57; glucose, 9.97.
40c.....	.....	Somersworth.	Sucrose, 31.73; glucose, 15.58.
Fancy Ponce.	Steadman & Hawkes, Portland...	Berlin.....	Contains glucose.
50c.....	Twitchell, Champlin Co., Portland	Berlin.....	Contains glucose.
50c.....	Shaw, Hammond & Carney, Portland	Berlin.....	Contains glucose.
50c.....	Twitchell, Champlin Co., Portland	Berlin.....	Contains glucose.
50c.....	Bowen & Bartlett, Boston.....	Colebrook....	Largely glucose.
40c.....	Shaw, Hammond & Carney, Portland	Colebrook....	Contains glucose.
45c.....	Twitchell, Champlin Co., Portland	Colebrook....	Contains glucose.

RESULTS OF EXAMINATIONS OF ADULTERATED MOLASSES.—*Concluded.*

Brand.	Wholesaler.	Where collected.	Remarks. Per cent. composition.
40c.....	H. S. Melcher & Co., Portland	Colebrook	Contains glucose.
50c.....	Shaw, Hammond & Carney, Portland	Colebrook	Contains glucose.
40c.....	Conant & Patrick, Portland.....	Colebrook	Contains glucose.
45c.....	Twitchell, Champlin Co., Portland	Colebrook	Contains glucose.
45c.....	Bowen & Bartlett, Boston.....	Colebrook	Contains glucose.
50c.....	Boyd, Dalton & Co., Boston.....	Lancaster	Contains glucose.
.....	Twitchell, Champlin Co., Portland	Lancaster	Contains glucose.
Ponce.....	M. L. Hall & Co., Boston	Lancaster	Contains glucose.
40c.....	Millikin, Tomlinson Co., Portland	Colebrook	Contains glucose.
45c.....	St. Johnsbury Grocery Co., St. Johnsbury, Vt.	Whitefield....	Contains glucose.
....	Shaw, Hammond & Carney, Portland	Whitefield....	Contains glucose.
50c.....	.....	Whitefield.. .	Contains glucose.
Compound	....	Whitefield....	Contains glucose.
50c.....	.....	Littleton.....	Contains glucose.
Porto Rico....	C. A. Weston & Co., Portland.....	Berlin.....	Contains glucose.
20c.....	Twitchell, Champlin Co., Portland	Berlin.....	Contains glucose.
25c.....	Shaw, Hammond & Carney, Portland	Berlin.....	Contains glucose.
50c.....	Shaw, Hammond & Carney, Portland	Berlin.....	Contains glucose.
50c.....	Twitchell, Champlin Co., Portland	Berlin.....	Contains glucose.
35c.....	Twitchell, Champlin Co., Portland	Berlin..... ...	Contains glucose.
Table Syrup..	F. H. Leggett & Co., New York ..	Berlin.....	Mainly glucose.
Vanilla Syrup	C. A. Weston & Co., Portland.....	Berlin.....	Mainly glucose.
60c.....	Milliken, Tomlinson Co., Portland	Dover.....	Contains glucose.
40c.....	Twitchell, Champlin Co., Portland	Somersworth.	Contains glucose.

OYSTERS.

Eighty-three samples, representing twenty localities, were examined, the results indicating an adulteration of but 7.2 per cent.

When the work of examining oysters was commenced at the State Laboratory of Hygiene three years ago, we found *forty-four* per cent. of the samples collected as fresh oysters to be preserved with borax or preservaline. Several cases of illness were reported from their use. The gradual reduction of this unlawful adulteration to seven per cent., in the face of protestations from the wholesale houses that the business could not be carried on without using preservatives, shows their claims to be false, and exhibits, in a limited measure, the results of the work.

OYSTERS—ADULTERATED.

Jobber.	Sampled at	Preservative.
Norfolk Oyster Co.	Keene.	Borax.
E. A. Atwood	Manchester	Borax.
	Dover	Borax.
Wheeler & Barnes	Franklin	Borax.
New England Oyster Co	Franklin	Borax.
	Tilton	Borax.

PICKLES AND RELISHES.

Two samples of pickles in jars were found to be colored with a coal tar derivative. This is a comparatively new departure in this form of adulteration, as the classic method of "greening" pickles is by the use of copper salts. Three samples also showed objectionable amounts of zinc, and alum was found in all cases, the latter being used by the most reputable packers for the alleged purpose of maintaining the goods in proper condition. Pending a ruling on this point by the Board of Health, such use will not be objected to for the present; as soon, however, as it can be demonstrated that pickles can be successfully marketed without the addition of alum, the use of the latter should be held as an adulteration.

Nine samples of Worcestershire sauce were examined, including all the brands on the market. Of this number the only adulterated sample was the well-known "Lea & Perrin's," the latter being preserved with salicylic acid. The manufacturers of this brand are evidently relying upon its reputation and extensive advertising to override, in the public estimation, any deficiencies of this nature. Recently this brand was found fault with in one of the western states, and the food commissioner was subsequently informed by the manufacturers that that particular state would henceforth be supplied with unpreserved stock. Purchasers of Worcestershire should appreciate that, while the variety containing antiseptic, aside from this objection, *may* be of good quality and prepared under proper hygienic conditions, the unpreserved form must necessarily be of the latter class.

SPICES.

But five of the forty-six samples examined were found to be adulterated. Most of the spice at present is sold in cartons, and such goods may generally be relied upon, although there is some tendency to misbranding in the case of certain varieties.

EXAMINATION OF ADULTERATED SPICES.

Brand.	Manufacturer.	Where collected.	Remarks.
Silver King Select Mustard.	Silver King Spice Mills, New York	Newmarket ..	Adul. with wheat starch.
Ground Cinnamon.....	Globe Mills, New York....	Newmarket ..	Adulterated.
Black Pepper Ardenter.....	W. G. Dean & Son, N. Y...	Rochester.....	Adulterated.
Mace.....	.....	Somersworth.	Adul. with Bombay mace.
Black Pepper (compound)..	B. Fischer & Co., N. Y.....	Concord.....	Contains cereal starch.
Royal Paprika.....	.....	Concord.....	Col. with coal tar dye; illegal.

EXTRACT OF VANILLA.

Of eighty-three samples examined, sixty-five were found to be adulterated or misbranded. The adulterants are coumarin (natural or synthetic), synthetic vanillin, and added color employed for the purpose of simulating strength and for covering up the fact that the goods have been prepared from synthetic materials.

The practice of fraudulent labelling in the case of these goods is rapidly diminishing, however, it being much more difficult at present to find such being offered than it was a year ago.

VANILLA EXTRACT FOUND ADULTERATED.

Brand.	Manufacturer.	Vanillin.	Coumarin.	Remarks.
Conc. Ext. Vanilla	Cal. Perfume Co., New York....	.100	Present.	Colored.
Conc. Ext. Vanilla	Grand Union Tea Co., Brooklyn	.087	.000	Very weak.
Quadruple Conc. Extract.	Paris Perfume Co., Jersey City.	.250	Present.	Vanillin synthetic.
Vanilla Extract..	... .	.00	Present.	Colored.
Ragus Extract Vanilla.	Ragus Tea and Coffee Co., N. Y.	.550	.000	Vanillin synthetic.
Superior.....	Kimball Bros., Enosb'g Falls, Vt.	.113	Present.	Colored.
Distilled Mexican	D. Lawrence Shaw, New York..	.263	.000	Vanillin synthetic.
Golden Cap.....	Fremont Extract Co., Boston....	.275	Present.	Vanillin synthetic.
Casco Vanilla....	Casco Ext. Co., Hartford, Conn.	.175	Present.	Vanillin synthetic.
Empire State.....	.....	.00	Present.	Colored.
Red Cross	Sage Bros., Boston.....	.00	Present.	Colored.
Phœnix.....	Falcon Pack. Co., New York....	.0625	.00	Very weak.
Conc. Extract....	Wm. P. Baker Co., New York...	.050	.000	Very weak.
Perfection.....	M. L. Hall & Co., Boston.....	.0475	.00	Very weak.
Gilt Edge.....	Anderson & Edwards, New York	.00	Present.	Artificial.
Vanilla Extract..	Samuel Stuart, Hartford, Conn.	.125	.000	Vanillin artificial.

VANILLA EXTRACT FOUND ADULTERATED.—*Concluded.*

Brand.	Manufacturer.	Vanillin.	Coumarin.	Remarks.
Bliss Standard....	Bliss Extract Co., Salem, Mass..	.125	Present.	Vanillin artificial.
Parlor City.....	Parlor City Extract Co.....	.000	Present.	Artificial.
Extract Vanilla..	Gertrude Mfg. Co., Lynn, Mass.	.025	.00	Colored.
Extract Vanilla..	Eureka Mfg.Co.,Hartford,Conn.	.0125	Present.	Colored.
Conc. Ext. Vanilla	W. W. Cranford, Stafford Springs, Conn.	.000	.000	Colored artificial.
Conc. Ext. Vanilla	New York Extract Co.....	.075	Present.	Artificial.
Conc. Ext. Vanilla	J. H. Folkins & Co., Boston.....	.000	Present.	Artificial.
Conc. Ext. Vanilla	Bell Chemical Co., Portland	.0625	Present.	Artificial.
Conc. Ext. Vanilla	New York Extract Co., N. Y....	.080	Present.	Artificial.
Conc. Ext. Vanilla	....	.325	.000	Vanillin artificial.
Conc. Ext. Vanilla	.....	.125	Present.	Artificial.
Conc. Ext. Vanilla	Saratoga Extract & Chem. Co., Saratoga Springs, N. Y.	.080	Present.	Artificial.
Delmonico.....	Fulton Extract Co., Boston.....	.0625	Present.	Artificial.
Comp. Ex. Vanilla	Abner Royce Co., Cleveland, O.	.1375	Present.	Artificial.
Red Seal Vanilla.	Red Seal Co.....	.000	Present.	Artificial.
Comp. Extract...	Abner Royce Co., Cleveland, O.	.040	Present.	Artificial.
Ext. Vanilla.....	Superior Extract Co.....	.045	Present.	Artificial.
"OUR" Vanilla..	Portland Flavoring Co., Portland, Me.	.040	.000	Amount vanillin too low.
Comp. Extract...	J. Smith Brockway Co., Boston.	.055	Present.	Artificial.
Queen City.....	Burlington Ex. Co., Burl'on, Vt.	.0325	Present.	Artificial.
Cotton's.....	C. L. Cotton Perfume & Ext. Co., Earlville, N. Y.	.035	.000	Low grade.
Conc. Extract....	F. H. Stevens, Colebrook.....	.040	Present.	Artificial.
Blue Seal.....	Blue Seal Ext. Co., Littleton....	.040	.000	Low grade.
Farley's Conc....	L. P. Farley, Boston.....	.035	.000	Low grade.
French's Genuine	R. T. French Co., Rochester, N.Y.	.100	Present.	Largely synthetic; artificially colored.
Leighton's Pure Extract.	R. G. Leighton, Portland.....	.150	Present.	Largely synthetic.
Pure Extract.....	.....	.125	None...	Artificially colored.
Rigby's.....	Rigby Extract Co., Portland....	.175	Present.	Largely synthetic; artificially colored.
Hall's High Grade.	Hall & Co., Portland.....	.150	None...	Artificially colored.
....	.....	.175	Present.	Largely synthetic; artificially colored.
.....	.....	.225	Present.	Largely synthetic; artificially colored.
Good Value.....	.....	.00	Present.	No vanillin: artificially colored.
Standard Quality	Carleton Extract Co., Boston...	.125	Present.	Largely synthetic; artificially colored.
Smith's Finest True Fruit.	J. Hungerford Smith, Rochester, N. Y.	.050	.....	Artificially colored.
Purity.....	Crystal Spring Bottling Co., Barnet, Vt.	.175	None...	Partly synthetic.
.....	George E. Davis, Laconia.....	.025	?	Deficient in vanillin; artificially colored.
"OUR" Vanilla..	Portland Flav. Co., Portland....	.150	Present.	Largely synthetic; artificially colored.
.....	Twitchell-Champlin Co., Portland.	.063	None...	Artificially colored.
.....	....	.075	None...	Artificially colored.

VINEGAR.

One hundred and forty-eight samples of cider vinegar were examined. The analytical results on the fifty-three samples found adulterated or below the standard are given in the following table:

RESULTS OF EXAMINATIONS OF ADULTERATED CIDER VINEGAR.

Maker or Wholesaler.	Acidity as Acetic Acid. Per Cent.	Solids. Per Cent.	Ash. Per Cent.	Polarization.	Precipitate with Lead Acetate.	Remarks.
.....	3.64	1.25	.12	0.0	Heavy....	Watered.
.....	3.50	1.31	.16	—.99	Slight.....	Watered.
.....	3.43	1.41	.28	—.88	Heavy....	Watered.
Haynes, Piper & Co., Boston	3.90	2.44	.31	0.0	Heavy. ..	Acidity low.
....	3.33	1.92	.31	—1.54	Heavy....	Acidity low.
C. E. Moody & Co., Boston.	4.71	.33	.10	+.50	None.....	Artificial.
.....	2.49	1.35	.21	—.88	Heavy ..	Watered.
Chas. Lawrence, Boston.	2.12	1.08	.20	—0.0	Heavy....	Watered.
.....	1.69	1.86	.27	—1.76	Heavy....	Watered.
.....	4.12	1.35	.24	—1.21	Moderate.	Low solids.
Milliken, Tomlinson & Co., Portland, Me.	2.83	2.56	.07	0.0	None	Artificial.
Silas Pierce, Boston.....	4.64	1.26	.30	—1.1	Heavy....	Low solids.
.....	1.71	.90	.26	—.55	Heavy....	Watered.
Delano, Potter & Co., Boston.	3.94	1.82	.11	—.99	Heavy....	Low acidity and ash.
.....	2.71	1.84	.30	—.11	Heavy....	Low acidity.
.....	3.79	1.79	.41	—.99	Heavy....	Acidity low.
.....	3.89	2.03	.31	—.40	Heavy....	Acidity low.
.....	3.84	1.78	.29	—.88	Heavy...	Acidity low.
.....	3.36	2.46	.27	—.77	Heavy....	Acidity low.
....	4.15	.44	.11	+1.20	None.....	Artificial.
.....	4.15	1.46	.35	—.55	Heavy ...	Solids low.
.....	4.97	.50	.07	+1.20	None.....	Artificial.
E. E. Clifford & Co., Portland, Me.	3.96	.19	.006	0.0	V. slight..	Artificial.
Stedman, Hawkes & Co., Portland, Me.	3.12	.58	.11	+.22	V. slight..	Artificial.
.....	4.13	.35	.09	+.66	None.....	Artificial.
E. E. Clifford & Co., Portland, Me.	3.86	.30	.05	+.88	None.....	Artificial.
C. A. Weston, Portland, Me.	3.46	.41	.07	+.44	None.....	Artificial.
D. M. Rowe, Laconia.....	2.33	.43	.11	+.77	None.....	Artificial.
Twitchell, Champlin Co., Portland, Me.	4.80	.72	.28	—1.1	Heavy....	Solids low.
....	3.26	4.31	.54	+3.20	Heavy....	Low in acidity and contains sugar.
St. Johnsbury Gro. Co., St. Johnsbury, Vt.	4.08	.34	.08	+.44	V. slight..	Artificial.

RESULTS OF EXAMINATIONS OF ADULTERATED CIDER VINEGAR.—*Concluded.*

Maker or Wholesaler.	Acidity as Acetic Acid. Per cent.	Solids. Per Cent.	Ash. Per Cent.	Polarization.	Precipitate with Lead Acetate.	Remarks.
St. Johnsbury Gro. Co., St. Johnsbury, Vt.	4.10	1.10	.08	+.33	Slight.....	Artificial.
....	1.03	2.39	.27	+.88	Heavy	Acidity low.
.....	1.99	1.44	.24	—.44	Heavy	Acidity low.
St. Johnsbury Gro. Co., St. Johnsbury, Vt.	3.98	.49	.14	—.44	None	Artificial.
.....	3.05	.46	.06	+.22	Slight.....	Artificial.
——, Providence, R. I..	4.10	1.50	.20	+2.31	Heavy	Artificial.
Chas. Lawrence & Co., Boston.	3.96	.64	.09	—.44	Moderate.	Artificial.
Conant, Patrick & Co., Portland, Me.	3.31	.75	.18	+.44	None.....	Artificial.
Henry Field, Chesterfield.	1.62	2.66	0.34	—0.77	Heavy	Below standard.
Cross, Abbott & Co.....	2.04	3.46	0.14	—1.76	Slight.....	Not genuine cider vinegar.
.....	2.20	3.28	0.27	—0.20	Heavy	Below standard.
F. Winter, Croydón.....	2.63	3.11	0.31	—0.66	Moderate.	Below standard.

MISCELLANEOUS EXAMINATIONS OF ADULTERATED OR MISBRANDED FOODS.

Article.	Manufacturer.	Collected at	Results of Examination.
Maraschino Cherries Victor Brand.	Rheinstrom Bros., Cincinnati.	Concord	Artificially colored.
Chocolate Candy	.. ..	Manchester.	Adulterated with iron oxide.
Chocolate Candy	D. Auerbach & Son, N. Y....	Concord	Adult. with iron and manganese oxides.
Chocolate Dates.....	—— Smith, White River Junction, Vt.	Concord	Adulterated with iron oxide.
*"Cyrantis".....	F. L. Miller, Boston.....	Rochester ..	Basis is a solution of sodium sulphite.
Chocolate Candy	.....	Claremont..	Adulterated with iron oxide.
Brandy Drops.....	....	Concord	Syrup contains 2.48 per cent. alcohol.
Cherries in Crême de Menthe.	Austin Nichols & Co., N. Y..	Keene.....	Adulterated with coal tar dye.
Maraschino Cherries.....	Denis Roger & Cie.....	Claremont..	Adulterated with coal tar dye.
Cherries in Crême de Menthe.	Rheinstrom Bros., Cincinnati.	Concord	Heavily colored with malachite green.
Essence Peppermint.....	E. R. Durkee & Co., N. Y....	Nashua.....	Heavily adulterated with coal tar dye.
Essence Wintergreen.....	E. R. Durkee & Co., N. Y....	Nashua.....	Heavily adulterated with coal tar dye.
Extract Wintergreen.....	R. T. French Co., Rochester, N. Y.	Franklin....	Heavily adulterated with coal tar dye.
California Orange Sugar..	Hygienic Specialty Co., Philadelphia.	Concord	Artificially prepared; col. with coal tar dye.
Pure Extract Banana.....	.....	Manchester.	Artificial goods; illegal labelling.
Pure Extract Strawberry..	.....	Manchester.	Artificial goods; illegal labelling.

*A candy adulterant.

MISCELLANEOUS EXAMINATIONS OF ADULTERATED OR MISBRANDED FOODS.—*Concluded.*

Article.	Manufacturer.	Collected at	Results of examination.
Compound Ext. Raspberry	.....	Manchester.	Artificial goods; illegal labelling.
Baker's Vegetable Color..	....	Manchester.	Contains coal tar dye.
Gilt Edge Pineapple Ext..	.....	Sanbor'ville	Artificial goods; illegal labelling.
Cream	.....	Dover.....	Contained 15 per cent. butter fat.
Cream	.....	Dover.....	Adulterated with gelatine.
*Sugar Substitute.....	.....	Manchester.	Mixture of saccharin and cane sugar.
†"Eggnot".....	Economy Egg Powder Co., Providence, R. I.	Concord	Frauduient.

*Said to be fifteen times sweeter than cane sugar. Examination shows this substance to be a mixture of ordinary cane sugar and saccharin. As the latter compound is in the nature of a drug, possessing distinct antiseptic properties, the sale of such mixture as a food preparation is not allowable.

†This is in truth "a remarkable substitute for fresh eggs." The manufacturer claims that "the contents of this can is equal to and will do the work of thirty-six fresh eggs." Examination shows it to consist almost wholly of artificially colored corn meal.

SUMMARY OF FOOD INSPECTION.

	Total number samples.	Adulterated, misbranded or varying from standard.	Percentage of adulteration
Bottled beverages	113	58	51.3
Butter	4	0	0.0
Canned fruits, jellies and jams	137	113	82.4
Canned soups and vegetables	24	8	33.3
Candy	27	18	66.6
Catsups and table sauces	77	66	85.7
Cheese	10	2	20.0
Coffee and cocoa	37	6	16.2
Condensed milk	24	1	4.1
Cream of tartar and baking powder	42	10	23.8
Dried fruits	23	7	30.44
Glucose	17	16	94.1
Honey	30	13	43.3
Ice-cream	30	13	43.3
Lard	4	3	75.0
Lemon extracts	94	73	77.6
Maple syrup and sugar	154	98	63.6
Meat products and fish	147	74	50.3
Milk	129	42	32.5
Molasses	195	45	23.0
Olive oil	8	0	0.0
Oysters	88	6	6.8
Pickles and relishes	10	5	50.0
Prepared mustard	10	2	20.0
Spices	46	5	10.9
Vanilla extracts	83	65	78.3
Vinegar	148	53	22.2
Not classified	45	23	51.1
	1,756	825	46.9

DRUG INSPECTION.

But little work has as yet been done in the field of drug inspection. A beginning in this direction, however, was recently made, 183 samples having been collected to date of this report. Following is a summary of the results of the examinations:

Acetanilide.—Eighteen samples were examined, all of which were found to be of good quality.

Aether.—Of 10 samples examined, five were found to be not in accord with U. S. P. requirements. Three of these, collected at Manchester and Concord, ranged in strength from 64.5 per cent. to 71 per cent., the Pharmacopœial requirement being 96 per cent. Two samples showed an acid reaction and one contained aldehydes.

Liquor calcis.—Two samples were examined, both being found of standard quality.

Caryophyllus.—Two samples, both of good quality.

Potass. bitartrate.—The two samples examined were of good quality.

Chloroform.—All four of the samples received were found to conform to requirements.

Capsicum.—Six samples were examined and found to be of standard quality.

Ext. glycyrrhizae.—Four samples; all of satisfactory quality.

Iodoformum.—Of the three samples examined, one, from Franklin, was found to be adulterated with 7 per cent. of earthy matter, while a second, collected at Franklin Falls and manufactured by Powers and Weightman, contained 2.43 per cent. of incombustible matter. The Pharmacopœial limit for the latter is 0.1 per cent.

Potass. iodidum.—The single sample examined satisfied the general requirements of the Pharmacopœia. It, however, showed traces of alcohol, in consequence of which the sample, on storage, gradually became yellow and developed an odor of iodoform.

Oleum limonis.—Five samples were received, one of which, from Franklin Falls, was found to be mixed with an equal volume of alcohol. The dealer claimed that such addition was for the purpose of preserving the oil, but this procedure is not in accord with the present Pharmacopœia.

Oleum amygdalae expressum.—Of the seven samples examined, all but one showed the presence of peach kernel oil.

Oleum olivae.—Five samples were received, two of which proved to be cotton-seed oil. The practice seems to be not uncommon with druggists of carrying two grades of "olive" oil, calls for the cheaper being dispensed under a "sweet oil" label.

Phenacetine.—Its very high cost and the fact that it is obtained solely by importation renders this drug especially liable to adulteration. How-

ever, of the 15 samples examined all, with but one exception, proved to be pure. The adulterated sample, purchased at Manchester, contained a large admixture of milk sugar. In examining this drug for acetanilide the melting point test was the one relied upon. The caustic potash test mentioned in the Pharmacopœia is notoriously unreliable and apparently worthless, while, in the writer's opinion, that with bromine is open to fallacy. The 14 pure samples all showed a melting point between 134 and 135 degrees C.

Saccharum lactis.—Of the 15 samples examined, 13 were found to be of standard quality. Two samples, both from goods manufactured by H. K. Wampole, Philadelphia, showed an abnormally high ash content, the amounts of this constituent being 0.35 per cent. and 0.80 per cent. respectively.

Spiritus camphorae.—Of the 16 samples examined, three, or 18.7 per cent., were of exactly prescribed strength; seven, or 43.7 per cent., were above required strength, while the remainder, or 37.6 per cent., ranged from 78 per cent. to 95 per cent. of the strength required. One sample, purchased at Franklin Falls, was prepared with wood alcohol.

Spiritus frumenti.—Two samples were examined, one of which, collected at Manchester, was found to contain but 38.42 per cent. by volume of alcohol. The Pharmacopœia requires a minimum of 44 per cent.

Sodii boras.—Of the nine samples examined, five were found to conform to requirements; two samples were of inferior quality, while two samples,—"Black Diamond Refined," prepared by Archibald & Lewis, New York, and "Empire" brand, prepared by Empire Packing Co., New York, were composed very largely of carbonate and bicarbonate of soda.

Sulphur sublimatum.—The two samples of this drug collected proved to be pure.

Sulphur lotum.—Three samples were examined and found to be in accord with Pharmacopœial requirements.

Sulphur precipitatum.—Fifteen samples were examined, only five of which were found conformable to requirements. Of the 10 below standard, seven, collected at Concord and Franklin Falls, showed incombustible residues ranging from 40 per cent. to 49 per cent. A pure preparation should afford no weighable residue. Assuming the grossest kind of carelessness on the part of the manufacturers in preparing this article, it is inconceivable that anything like such a proportion of lime salts is explainable as being due to accident. As the precipitated variety costs several times as much as the ordinary, the purchaser of the former is warranted in expecting to secure at least as good an article as the latter. In reality, however, the 10 low-grade samples of precipitated sulphur were all inferior in quality to the samples of sublimed.

Acidum tannicum.—Six samples were examined, none of which conformed to the requirements of the Pharmacopœia. Four contained an excess of ash, while all showed more than traces of resinous matter.

Tinctura iodi.—Thirty-three samples were received and analyzed, with results as follows:

Above required strength	3, or 8.8 per cent.
95–100 per cent. required strength	2, or 6.0 per cent.
85–95 per cent. required strength	5, or 15.1 per cent.
75–85 per cent. required strength	9, or 27.2 per cent.
65–75 per cent. required strength	9, or 27.2 per cent.
50–65 per cent. required strength	4, or 12.1 per cent.
Below 50 per cent. required strength	1, or 3.0 per cent.

Of the above, five samples were prepared with wood alcohol. The use of methyl alcohol in making this tincture, while not so reprehensible as in the case of a preparation solely intended for internal use, is, nevertheless, open to severe criticism. Aside from the fact that this tincture is occasionally administered internally, the absorbability of wood alcohol through the skin is now well recognized. Moreover, the substitution of this solvent for ethyl alcohol is in violation of the instructions of the Pharmacopœia.

SUMMARY.

	Number examined.	Adulterated or below standard.	Per cent. of adulteration.
Acetanilide	18	0	0
Aether	10	5	50.0
Liquor calcis	2	0	0
Caryophyllus	2	0	0
Potass. bitartrate	2	0	0
Chloroform	4	0	0
Capsicum	6	0	0
Ext. glycyrrhizae	4	0	0
Iodoformum	3	2	66.6
Potass. iodidum	1	1	100.0
Menthol	1	1	0
Oleum amygdalae expressum	7	6	85.7
Oleum menthae piperitae	1	0	0
Oleum olivae	5	2	40.0
Phenacetine	15	1	6.6
Saccharum lactis	15	2	13.3
Spiritus camphorae	16	7	43.7
Spiritus frumenti	2	1	50.0
Sodii boras	9	4	44.4
Sulphur sublimatum	2	0	0
Sulphur lotum	3	0	0
Sulphur praecipitatum	15	10	66.6
Accidum tannicum	6	6	100.0
Tinctura iodi	33	31	94.0
Total	182	79	

Respectfully submitted,

C. D. HOWARD,

Chemist.

TANNIN IN COFFEE.

C. D. HOWARD.

The fruit of the coffee tree (*coffea arabica*) consists of a dark, reddish berry, composed structurally of the two seeds or "beans" placed face to face, and a series of three enveloping membranes. By special treatment, the two outer membranes, known as the shell or "husk" and the "parchment" are easily removable, and the berry, as it is received by the coffee roasters, consists of the two beans, each enveloped by the inner covering or "skin."

Chemically, raw coffee consists of cellulose, gum, dextrine, saccharine matter, proteids, the alkaloid caffeine and an astringent principle known as caffetannic acid. The principal effect of roasting, aside from converting much of the sugar into caramel, is in the transformation of some of the fatty material into a fragrant oil known as caffeol, the latter being the chief aromatic principle of coffee.

The physiological effects of coffee are principally due to the caffeine and the caffetannic acid. While the action of caffeine as a general stimulant and as a diminisher of fatigue is well understood, there is some reason for believing that the ill effects attendant upon the excessive use of coffee, —such as derangement of the digestive processes, constipation and general debility—are attributable, in a very large measure, at least, to the caffetannic acid. Certain it is, the alkaloid caffeine does not possess all of the therapeutic or toxic properties of coffee.

Contrary to a popular notion the tannin of coffee, while astringent in nature, yet, unlike the tannin of tea, does not precipitate gelatine solution, and will not, therefore, "tan." Chemically, these two forms of tannin differ very materially, tea tannin being considered as existing mainly as ordinary oak-tannin (quercitannic acid), while that of coffee is regarded as a double caffetannate of potash and caffeine. Moreover, while the tannin of tea probably has but little influence upon its normal flavor and could well be dispensed with, caffetannic acid, on the other hand, is an essential constituent of coffee, and could not be eliminated without seriously impairing the flavor of this decoction.

Based upon the popular view that coffee is injurious, a host of cereal substitutes now find extensive sale. Although in many cases the most extravagant claims are made for the nutritive virtues of these preparations, yet the fact remains that not a few of them are but waste products

occurring in the manufacture of other foods. Examination of one of the most extensively advertised of these substitutes shows that it is, substantially, nothing more than the roasted bran or hulls of wheat.

Realizing that a large proportion of the present consumers of cereal drinks would gladly return to the use of coffee could they be assured of an article from which the injurious constituents had been removed, several coffee roasters have placed upon the market brands for which varying claims have been made concerning the elimination of tannic acid. The analyses of three such brands follow:

No. 2607.—"Detanated India Coffee," prepared by Clark, Coggin & Johnson Co., Boston, has, according to the manufacturers, "the advantage of having had removed from it all the injurious elements that make coffee a menace to health to certain people." "Tannin also is a poison to many people . . . this completely removed, as has been the case in 'Detanated India Coffee,' does away with the injurious effects usually produced to many people when coffee has been used."

No. 2608.—"Barrington Hall Steel Cut Coffee," prepared by Baker & Co., Minnnapolis, Minn., bases its principal claim for favor upon other merits. The manufacturers do, however, make the statement that "the chaff, ordinarily ground up with coffee, contains only the astringent principle (tannin), and not only injures the fine flavor of the coffee, but is the basis for the objection that some people have for using coffee. Remove it as from 'Barrington Hall,' and it leaves only the rich flavor of the pure coffee, which can be used by the most delicate. . . . *can be used without ill effect* by those who find that ordinary coffee injures them, because the yellow tannin bearing skin and dust (the only injurious properties of coffee), are removed by the steel cut process."

No. 2613.—"Digesto Coffee," prepared by Digesto Coffee Company, Greenwich Street, New York, "contains no caffeine or tannic acid." The manufacturers claim it to be "the highest grade of coffee with the caffeine and tannic acid eliminated by our own process." "No more headaches, no more nervous dyspepsia, no more sleepless nights," etc.

A comparison of the analyses of these products with that of an ordinary Java and Mocha blend, and also with one of the "harmful" chaff or skin, shows the fallacy of these claims with regard to the removal of tannin:

	"Barrington Hall."	"Detanated."	"Digesto."	Java and Mocha.	Coffee chaff.
Moisture	2.70%	2.70%	2.26%	3.13%	2.60%
Ash	4.10	4.05	3.61	4.13	5.65
Fat	13.18	14.12	12.55	14.10	9.30
Caffeine	1.17	1.33	0.87	1.29	0.40
Fiber	18.46	15.70	22.70	15.50	26.50
Caffetannic acid	10.76	11.04	7.61	11.17	5.98

In two of these cases the manufacturers base their claims for the "complete removal of tannic acid" upon the elimination, during the process of grinding, of the chaff or skin occurring on the surface and, to some extent, enmeshed in the groove of the coffee bean. That such removal of the chaff cannot possibly have any appreciable effect on the tannin content of the product is evident from the composition of this material, as shown above. The only practicable method by which the caffetannic acid could be extracted is that of treatment with hot water, and this process would involve the simultaneous removal of the caffeine. In consequence, while the claims made for "Digesto Coffee" are more logical than in the case of the other two brands, yet it is evident in this instance that a complete extraction of these constituents could not have been effected, otherwise the resulting product would be but little different from the residual "grounds" from coffee making.

SULPHUROUS ACID AND THE SULFITES: FOOD PRESERVATIVES.

The frequent use of sulphurous acid and the sodium salt, sodium sulfite, as preservatives of meats, canned and dried vegetables and beverages such as beer, wine and cider, and the light summer drinks, calls for special notice on the part of this laboratory. We have found them to be employed to a large extent in preserving and brightening the color of meats, such as Hamburger steak, sausages, etc., and in the beverages intended for consumption during warm weather, especially in lime juice.

Sulphurous acid has been used as a meat preservative for many years, being first suggested in 1856 by Roberts, who employed the gaseous sulphurous acid for that purpose. Several devices were patented for treating meats with various mixtures, all depending for their efficacy on some form of sulphurous acid. During the siege of Paris Gorgas added a dilute solution of hydrochloric acid and sodium sulfite to mutton and found that meat so treated was slow to undergo decomposition. But none of these devices were practical because they were either ineffective or costly. The use of the salts of the acid, barium, calcium and sodium sulfite and bisulfite, especially the neutral anhydrous salt, sodium sulfite, has been constantly growing, however, and it is this salt which is now most commonly employed.

Our attention has been recently called to the extent to which it is used by the analyses of several samples of chopped meats, known as Hamburger steak, that were prepared in Boston and shipped to our markets.

We were also fortunate in finding a sample of the preservative in the back room of a meat market, a positive proof that the proprietor of the shop was well acquainted with its use. We have made an analysis of this article, "XXX Preservaline," made and sold by The Preservaline Manufacturing Co., Warren St., New York City, and find it to be composed of 86.44 per cent. sodium sulfite, and 13.56 per cent. sodium sulfate. In other words the much advertised "Preservaline" is a crude salt of sodium sulfite, containing a considerable percentage of the sulfate as an impurity.

Of the virtues of this preservative the manufacturers say, "The most serviceable article ever offered. No butcher should be without it. 'XXX' Preservaline is the only article of the kind ever offered the trade. It is not a coloring material, but a fine white powder, which not only

preserves the meat sound and fresh for weeks, but also produces a handsome blood-red color. It prevents slime and mould on meats, and saves the necessity and expense of trimming. It is odorless, tasteless, absolutely harmless, most convenient and always reliable." The directions for use call for the addition of one ounce of "XXX" Preservaline to every fifty pounds of meat, sprinkled over the meat before or while it is being chopped, or mixed with the meat after chopping.

The use of this preservative is absolutely prohibited. It produces marked physiological effects, even when administered in small doses for any length of time. It masks decomposition and imparts to old meat the color and appearance of freshly cut meat and enables the dealer to dispense with cleanly methods and refrigeration in handling meat products.

The use of this and other food preservatives is frequently excused by the plea that antiseptics as used in perishable foods are less injurious to health than the poisonous products of the spontaneous decomposition that would eventually ensue if the foods were not so treated. This argument is wholly unsound because the decomposition of food should be a fact of exceptional occurrence, and such food should be rejected altogether; whereas the systematic addition of an antiseptic to a food, in order to prevent decomposition, would result in the habitual dietetic use of a powerful drug. While we are so careful of health that every prescription filled at a drug store must be put up under the direction of a trained and responsible person and the prescription as received from the physician filed as a safeguard against possible accident or harmful intent, the manufacturers of these antiseptic drugs sell their goods to be employed by irresponsible persons in dosing food products consumed by well and ill alike, without their knowledge or power to determine or prevent.

Butchers, marketmen and all retailers of meats are cautioned against the employment of any "preservatives" or antiseptics in handling their goods, except the well-known articles, salt, sugar, saltpeter, vinegar, spices and wood smoke, and are advised to request their shippers to refrain from sending them any articles that are treated with any preservative other than those alluded to above.

EXAMINATION OF ALCOHOLIC AND MALT LIQUORS.

Chapter 35, Laws of 1903, entitled "An Act to Regulate the Traffic in Intoxicating Liquors," provides, in section 21, for the collection of samples of liquors from licensed vendors for examination at the State Laboratory of Hygiene. Under this law, during the past two years there were examined for the State License Commission 483 samples of wines and distilled liquors and 82 samples of malt liquors. Following is the report of the chemist:

Dr. Irving A. Watson, Secretary State Board of Health.

DEAR SIR: I desire to submit to you a report of the examination of alcoholic liquors, conducted at the Laboratory of Hygiene during the past two years. The analyses represent samples collected since October 1, 1904, by agents of the State License Commission, and on which reports have been transmitted from time to time to such Commission.

In the case of distilled liquors, there being no legal standard therefor, the regular pharmacopœial standard has been employed. The requirements stated in the eighth decennial revision provide that the specific gravity of whiskey "shall not be more than 0.945 nor less than 0.924 at 15.6°C., corresponding, approximately, to an alcoholic strength of 37 to 47.5 per cent. by weight, or 44 to 55 per cent. by volume, of absolute alcohol." It is also required that the total solid residue obtained by the evaporation of 100 c.c. shall not weigh more than 0.5 gram.

As will be observed, a very large proportion of the samples examined do not conform to these requirements, watering, or "reducing the strength,"—usually accompanied by a compensating addition of caramel and some flavoring agent—being, apparently, a common practice. Indeed, a recent publication addressed to the liquor trade openly recommends this practice, advising that the average patron will be better satisfied with a whiskey below the recognized standard of strength, and to this end gives rules and formulæ for the systematic reduction of liquors to any desired strength or "proof." Thus, the author states that "the average proof of whiskey sold over the bar to better trade is 100 per cent. (50 per cent. alcohol by volume). The average drink is two ounces. There are 128 ounces to the gallon, or 64 drinks. One gallon of 100 per cent. proof whiskey reduced to 80 per cent. proof (40 per cent. by volume of alcohol) takes one quart of good, clear water, equal to 16 drinks, or 80 drinks to the gallon. By following these directions you give more satisfaction to the consumer, and gain about 25 per cent. on your daily

receipts." In practice, it would seem that the "rectifier" or dealer frequently have no compunctions about stretching the 80-per-cent. limit but in many instances continue the dilution to 70 per cent. or even 60 per cent. proof, while for the very cheapest trade the reduction is sometimes continued to 50 per cent. Apparently, at present there is no legal means of preventing the New Hampshire saloon keeper from watering his stock as much as he may see fit. There is much need of a law in this connection fixing a legal standard, either directly, or by authorization of the one laid down in the Pharmacopæia.

It is now customary to recognize four distinct classes of whiskey (and the same applies, in large measure, to rum, brandy and gin); Shepard has stated this classification as follows:

"1. Whiskey manufactured wholly in the distillery under government supervision, where rectification is not used. This whiskey is matured or aged in wood, and when sold it carries two stamps, one that of the warehouse and the other a tax paid stamp. The whiskey may also be put up in bottles, while in the government warehouse, and sealed by a government stamp, when it is said to be bottled-in-bond. This is the most expensive whiskey to manufacture, owing to the long time required for maturation.

"2. Blended whiskies are also found upon the market. These are made by taking two or more whiskies of the first class and blending them in such proportions that certain properties, such as quality, aroma, body, etc., may be developed to suit certain critical requirements. But the quantity of such blended whiskey found on the market is not great. In fact, such blends offer no commercial inducements, since the blend could not be produced as cheaply as the original whiskies.

"3. Another class of whiskey, and, by far, the largest of them all, is made by adding 'silent spirit' or 'cologne spirit' and water to a whiskey of the first class. Usually some caramel is added to restore the color lost by the addition of the silent spirit and water. The flavor of this class of whiskey is imparted by the original whiskey of the first class used in the manufacture. In this way a whiskey of the first class is stretched so that the number of gallons of the finished product far exceeds the quantity of the original whiskey of the first class employed. This process of manufacture is called 'blending,' since the original whiskey is mixed with the silent spirits and water. It is also called 'rectifying' since the manufacturer has a rectifier's license and uses the silent spirits produced in rectifying stills. The terms 'rectified' whiskey and 'blended' whiskey are now commonly applied to whiskey of this class. It is cheaper to manufacture than whiskey of the first class.

"4. The fourth class of whiskey found upon the market is wholly artificial. It is made by adding water and coloring matter, beading oil, various essences and other substances to silent spirits. This whiskey is wholly factitious, and there is no limitation on the manufacturer as to the substances employed. Where this whiskey is named at all it tries to classify itself with whiskey of the third class. This is the cheapest whiskey on

the market and its *proofage (i. e., content of alcohol) is usually the least that the demands of the trade or the law of the state in which it is sold will allow.*"

That the greater part of the goods sampled for the License Commission falls in one or the other of the last two classes is evident from an inspection of the tables, and, if the samples taken are representative of the stock on sale, it would seem apparent that there is not very much genuine, "straight" whiskey to be had in New Hampshire. This condition of affairs is probably the rule throughout New England, for, in referring to the results of examinations in Massachusetts,[1] Leach states: "A large proportion of the liquors were found to be of the so-called 'blended' or 'rectified' variety, made of cologne spirit, colored with caramel, often watered, and containing in some cases such artificial fruit essences as œnanthic and pelargonic ethers, added for flavor. The 'rectified' variety of whiskey often contains no fusel oil. Several samples contained raw, or unaged whiskey, with notable traces of the fusel oil which exists in nearly all pure whiskey, even when aged. In fact, nothing was found in any of the samples more harmful than the alcohols which are found in the purest whiskey; and, as shown, most of the samples were weak in alcohol." It should be stated that, beginning January 1, 1907, the federal law requires that all such goods entering interstate commerce shall bear a label setting forth, in detail, the proportions of the foreign materials entering into the composition of the liquor.

As regards the question of fusel oils in liquors, it may be of interest to state that former views are now undergoing a change. Up until the past two or three years the composition of alcoholic liquors had received very little study indeed, and until but recently no reliable method for the estimation of fusel oil existed. Formerly, it was held that the principal advantage accruing from the aging process was in that this fusel oil, regarded as highly poisonous, became thereby gradually oxidized and eliminated. Recent investigations in this direction, however, would seem to indicate that the content of fusel oil does not diminish at all with age, that the "mellowing" is due to the elimination and resinification of certain other bodies always present in raw, pot-still liquor (pyrrol, phenol, sulphur bodies); and, finally, that the danger of impairment to health from fusel oil, existing as it does in such relatively insignificant quantity, is far less than that probably ascribable to the physiological effects of the ordinary alcohol in liquor.

Respectfully submitted,

October 1, 1906. C. D. HOWARD,

Chemist.

[1] Report Massachusetts Board of Health, 1904, page 341.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 cc. No. cc. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
164	Rose Valley Whiskey	Somersworth	.9430	45.41	0.28					
165	Whiskey	Manchester	.9477	42.51	0.99					High solid residue.
166	Whiskey	Manchester	.9444	45.15	0.29	4.0	Slight	5.5		Not a straight whiskey
167	Whiskey	Manchester	.9444	44.52	0.66					High solid residue.
168	Whiskey	Manchester	.9489	41.10	0.65					Low in alcohol; high solid residue.
169	Whiskey	Manchester	.9595	35.10	1.00					Watered and sweetened.
170	Whiskey	Manchester.	.9415	46.32	0.15					
171	Whiskey	Manchester	.9444	44.52	0.43					
172	Whiskey	Manchester	.9499	41.87	1.99					Low in alcohol; sweetened.
173	Scotch Whiskey	Concord	.9483	45.17	0.12					
174	S. S. P. Whiskey	Concord	.9387	47.70	0.13					
175	Whiskey	Concord	.9372	47.47	0.17					
180	Whiskey	Berlin	.9617	33.02	0.14	2.0	Slight	4.5		Made from neutral spirits; much watered.
181	Whiskey	Berlin	.9493	41.62	0.56					Alcohol low.
182	Old Charity Whiskey	Berlin.	.9446	44.45	0.16					
183	Whiskey	Berlin	.9440	44.80	0.14					
184	Whiskey	Berlin	.9486	42.05	0.76	5.0	Mod	5.0		Alcohol low· not pure whiskey.
185	Rose Valley Whiskey	Berlin	.9565	36.87	0.19					Watered.
186	Glen Lily Whiskey	Berlin	.9580	35.80	0.17					Watered

187	Whiskey									
188	Whiskey	Dover	.9531	39.15	0.67					Watered; high solid residue.
189	Whiskey	Dover	.9418	46.04	0.36					
190	Whiskey	Dover	.9514	40.26	0.20					Low in alcohol.
191	Whiskey	Dover	.9562	37.06	0.26					Watered.
192	Whiskey	Dover	.9495	41.46	0.16	2.0	None	3.0		Artificially prepared from neutral spirits.
193	Whiskey	Dover	.9473	42.80	0.13					Low in alcohol.
206	Whiskey	North Walpole.	.9480	43.30	0.60	4.5	Mod	5.0		Low in alcohol; not straight whiskey.
207	Whiskey	North Walpole.	.9494	42.00	0.68					Low in alcohol; high solid residue.
208	Rum	North Walpole.	.9500	40.90	0.08	8.0	Mod	1.0		Low in alcohol.
209	Atherton Whiskey	North Walpole.	.9555	38.90	0.74					Watered; high solid residue.
210	Rum	North Walpole.	.9373	48.60	0.57					
211	Monogram Rye Whiskey	North Walpole.	.9443	45.50	0.28					
212	Old Cumberland Rye Whiskey	North Walpole.	.9441	44.90	0.76	8.0	Mod	5.0		High solid residue.
213	Whiskey	North Walpole.	.9462	44.00	0.90	6.0	Mod	6.0		High solid residue.
214	Sam Clay Whiskey	North Walpole.	.9463	44.95	1.12	9.0	Heavy	5.0		Sweetened.
215	Medford Rum	North Walpole.	.9449	44.92	0.13	5.0	Mod	2.5		
216	XXXX Whiskey	North Walpole.	.9513	40.80	0.76	6 0	Mod	6.0		Low in alcohol; high in solids; doctored goods.
217	Crown of Baltimore Whiskey	North Walpole.	.9439	45.75	0.39					
218	Gin	North Walpole.	.9429	45.16	0.017					
219	Gin, Primrose	North Walpole.	.9351	44.90	0.481					Sweetened.
220	Gin	North Walpole.	.9446	44.50	0.321					Sweetened.
221	Gin	North Walpole.	.9435	44.90	0.028					
222	Gin	North Walpole.	.9439	44.90	0.017					
223	Whiskey	Manchester	.9555	38.20	0.18					Watered.

* For comparative purposes, the color was determined by direct observation in the half-pint flask in which the sample was submitted, using as standards, solutions of caramel of different strengths. The caramel solution was standardized by making 10 c. cm. of a one per cent. iodine solution to 200 c. cm. and adding 0.5 c. cm. of a 0.1 per cent. solution of starch thereto, the color of the resulting liquid being arbitrarily designated as 5.0 of the scale. A strong solution of caramel is prepared and such volume of the latter diluted to 200 c. cm. as shall correspond to the color of the standard iodine solution. Then, by diluting proportional volumes to 200 c. cm. the other colors of the scale may be prepared.

Whiskies were found to range in color from 4 to 9; rums, from 2 to 5; gins, from practically colorless to 0.5.

In estimating the color removed by shaking with fuller's earth, the filtrate from this operation is compared with a similar volume of a standard caramel solution prepared as above, the per cent. of residual color being estimated by dividing the color of the filtrate by the original color of the liquor.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 c.c. No. c.c. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
224	Rum	Manchester	.9544	38.54	0.09	3.0	None	2.0		Artificial; below standard in alcohol.
225	Whiskey	Manchester	.9566	37.46	0.23	7.0	Mod	7.5		Watered and compounded.
226	Whiskey	Manchester	.9524	40.04	0.17	1.5	Slight	6.0		Made from neutral spirits; low in alcohol.
227	Whiskey	Manchester	.9566	37.36	0.25	1.5	None	7.0		Made from neutral spirits; diluted below alcoholic standard.
228	Whiskey	Manchester	.9469	43.74	0.69	3.0	Slight	4.5		Low alcohol; high solids; not straight whiskey.
229	Rum	Manchester	.9499	41.64	0.41	4.0	Slight	2.0		Low in alcohol; not straight rum.
230	Gin	Manchester	.9499	41.20	0.018					
231	Gin	Manchester	.9587	35.27	0.045					Watered.
238	Rum	Manchester	.9552	37.52	0.125	4.0		1.5	Artificial	Watered; not genuine rum.
239	Rum	Manchester	.9450	43.90	0.108	4.8		2.0	Artificial	Not genuine rum.
240	Whiskey	Manchester	.9539	38.90	0.30	3.2		5.0	Artificial	Watered; artificial.
241	Rum	Manchester	.9565	36.44	0.15			2.0	Artificial	Watered.
242	Whiskey	Manchester	.9592	34 96	0.24					Watered.
243	Whiskey	Manchester	.9490	41.78	0.156	4.0			Largely artificial	Low in alcohol; not straight whiskey.
244	Rum	Manchester	.9592	34.95	0.17	3.0	Slight	3.5	Largely artificial	Watered and otherwise doctored.
245	Whiskey	Manchester	.9558	37.34	0.15	6.0	Mod	3.5	Largely artificial	Watered and compounded.
246	Rum	Manchester	.9443	44.54	0.143	9.6	Mod	3.0	Natural	
247	Whiskey	Manchester	.9544	38.12	0.231				Natural	Watered.
248	Whiskey	Manchester	.9553	37.22	0.201			3.5	Largely artificial	Watered.

249	Rum	Manchester	.9558	37.72	0.086	3 0	Slight	2.0	Artificial	Artificial; low in alcohol.
250	Whiskey	Manchester	.9454	43.98	0.155	4.0	Mod	3.5	Largely artificial	Not a straight whiskey.
251	Whiskey	Manchester	.9443	44.84	0.648	8.0	Mod	4.0	Partly artificial	High solid residue.
252	Gin	Manchester	.9427	45.52	0.034	1.0	None	0.1		
253	Gin	Manchester	.9546	38.17	0.051					
254	Gin	Manchester	.9552	37.80	0.111			0.1		
255	Gin	Manchester	.9562	37.11	0.024	1.0	Slight	0.05		
256	Sunny Brook Whiskey	Nashua	.9525	44.00	1.664	10.0	Heavy	4.5	Partly artificial	Genuine whiskey; sweetened and colored.
257	Whiskey	Nashua	.9393	47.98	0.312	8.8	Mod	3.0	Artificial	Compounded.
258	Whiskey	Nashua	.9671	32.52	1.568	5.6	Slight	5.0	Artificial	Watered, sweetened and otherwise doctored.
259	Whiskey	Nashua	.9438	44.90	0.360	8.8			Natural	
260	Whiskey	Nashua	.9412	46.98	0.334	1.0	None	3.5	Largely artificial	Made from neutral spirits.
261	Whiskey	Nashua	.9429	46.14	0.294			4.0	Natural	
262	Monogram Rye Whiskey	Nashua	.9426	46.42	0.792	6.4	Slight	5.0	Largely artificial	High solid residue; not straight whiskey.
263	Whiskey	Nashua	.9454	45.20	0.672	1.0	None	4.0	Largely artificial	Artificial.
264	Gin	Nashua	.9349	49.78	0.087			0.1		
265	Gin	Nashua	.9347	49.87	0.023			0.05		
266	Gin	Nashua	.9464	43.39	0.074			0.1		
267	Gin	Nashua	.9457	43.83	0.031			0.05		
268	Gin	Nashua	.9452	44.09	0.078			0.1		
274	Whiskey	Manchester	.9582	35.64	0.254	4.0	None	4.0	Largely artificial	Compounded and watered.
275	Rum	Manchester	.9565	36.86	0.142	6.4	Mod	2.5	Artificial	Watered and colored.
278	Whiskey	Manchester	.9569	37.48	0.267	2.4	None	5.0	Artificial	Artificial; watered.
279	Whiskey	Manchester	.9450	45.50	0.448	12.8	Much	4.0	Largely artificial	Straight whiskey containing added color.
280	Whiskey	Manchester	.9442	45.80	0.675	6.4	V. slight	4.5	Largely artificial	Compounded.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol per cent. by vol.	Solids.	Acidity in 100 c.c. No. c.c. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
281	Whiskey	Manchester	.9538	38.80	0.208	4.0	V. slight	5.0	Artificial	Compounded and watered.
282	Rum	Manchester	.9535	38.94	0.121	4.8	V. slight	2.0	Largely artificial	Made from neutral spirits; low in alcohol.
283	Rum	Manchester	.9580	35.78	0.128	4.0	None	2.0	Artificial	Made from neutral spirits; water'd.
284	Whiskey	Manchester	.9565	36.30	0.278	2.4	None	7.5	Artificial	Made from neutral spirits; water'd.
285	Whiskey	Manchester	.9574	36.82	0.400	4.0	Slight	5.0	Artificial	Compounded and watered.
286	Whiskey	Manchester	.9561	37.15	0.189	5.6	Slight	4.5	Largely artificial	Compounded and watered.
287	Rum	Manchester	.9483	42.22	0.095	4.0	V. slight	2.5	Artificial	Not straight rum; low in alcohol.
288	Whiskey	Manchester	.9551	37.82	0.146	4.8	Mod	3.5	Largely artificial	Not straight whiskey; watered.
290	Rum	Manchester	.9486	42.16	0.442	8.0	Mod	4.0	Largely artificial	Low in alcohol.
291	Whiskey	Manchester	.9549	39.20	0.291	8.0	V. slight	4.0	Artificial	Watered and otherwise doctored.
292	Whiskey	Manchester	.9557	37.45	0.170	2.0	None	3.5	Artificial	Made from neutral spirits; alcohol strength low.
306	Gin	Manchester	.9566	36.78	0.009			0.00		Watered.
307	Gin	Manchester	.9519	41.50	0.610			0.20		Sweetened.
308	Gin	Manchester	.9595	34.70	0.082			0.1		Watered.
309	Gin	Manchester	.9582	35.61	0.048			0.1		Watered.
310	Gin	Manchester	.9572	36.40	0.008			0.00		Watered.
311	Gin	Manchester	.9556	37.48	0.031			0.1		Watered.
312	Gin	Manchester	.9520	39.92	0.050			0.15		Low in alcohol.
313	Gin	Manchester	.9539	38.66	0.054			0.15		Low in alcohol.

314	Gin	Manchester	.9542	38.44	0.076			0.2		Low in alcohol.
315	Gin	Manchester	.9448	44.82	0.014			0.05		
316	Gin	Manchester	.9562	37.05	0.009			0.05		Watered.
317	Gin	Manchester	.9406	46.69	0 019			0.05		
318	Rum	Manchester	.9544	38.31	0.083	5.6	V. slight	2.0	Artificial	Watered; not straight rum.
319	Rum	Manchester	.9567	36.78	0.080	2.4	None	2.0	Artificial	Artificial; alcoholic strength low.
320	Whiskey	Manchester	.9561	37.18	0.118	2.4	None	3.0	Artificial	Made from neutral spirits; low in alcohol.
321	Rum	Manchester	.9593	34.88	0 085	2.0	None	2.0	Artificial	Made from neutral spirits; alcoholic strength low.
322	Whiskey	Manchester	.9556	37.50	0.181	2.4	None	3.5	Artificial	Artificial; low in alcohol.
323	Whiskey	Manchester	.9551	37.82	0.200	7.2	Slight	3.5	Artificial	Watered and "blended."
324	Whiskey	Manchester	.9572	33.54	0.317	2.0	None	6.5	Artificial	Artificial; alcohol very low.
326	Whiskey	Manchester	.9585	35.42	0.136	3.2	V. slight	5.0	Artificial	Artificial; alcohol low.
327	Whiskey	Manchester	.9561	37.18	0.133	3.2	Slight	3.5	Artificial	Artificial; alcohol low.
328	Rum	Manchester	.9516	40.18	0.161	8.8	Marked	2.0	Largely artificial	Low in alcohol.
329	Rum	Manchester	.9573	36.28	0.108	3.0	V. slight	2.0	Largely artificial	Not straight rum; watered.
330	Rum	Manchester	.9572	36.40	0.171	2.0	None	2.0	Artificial	Artificial; alcohol low.
331	Whiskey	Manchester	.9570	37.48	0.264	2.0	None	7.0	Artificial	Artificial; alcohol low.
332	Rum	Manchester	.9620	32.79	0.095	4.0	V. slight	2.0	Artificial	Much watered; not straight rum.
333	Rum	Manchester	.9558	37.35	0.110	2.4	None	1.5	Artificial	Artificial; low in alcohol.
334	Rum	Manchester	.9550	37.92	0.100	2.4	Slight	2.0	Artificial	Artificial; low in alcohol.
335	Rum	Manchester	.9446	44.48	0.112	6.4	Marked	1.7	Natural	Probably genuine.
336	Rum	Marlow	.9470	43.00	0.068	3.2	None	1.5	Artificial	Not genuine rum.
337	Whiskey	Hinsdale	.9488	43.20	0.298	7.2	Marked	3.5	Largely artificial	Not straight whiskey.
338	Whiskey	Hinsdale	.9566	36.98	0.108	1.5	None	3.5	Artificial	Made from neutral spirits; alcohol low.
339	Whiskey	Stoddard	.9496	41.40	0.145	9.6	Mod	2.0	Natural	Probably genuine but low in alcohol.
340	Rum	Hinsdale	.9493	41.64	0.206	20.0	Mod	4.0	Largely artificial	Low in alcohol; abnormal acidity.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 cc. No. cc. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
341	Rum	Hinsdale	.9733	22.75	0.034	4.0	Mod	0.5	Largely artificial	Artificially colored and heavily watered.
342	Whiskey	Chesterfield	.9373	48.50	0.110	5.0	Mod	2.0		Not straight whiskey.
343	Whiskey	Hinsdale	.9426	46.08	0.364	8.0	Marked	3.5	Natural	
344	Gin	Hinsdale	.9430	45.84	0.041		None	0.1		
345	Gin	Hinsdale	.9386	47.78	0.090		Slight	0.1		
346	Gin	Hinsdale	.9334	50.62	0.048		None	0.00		
347	Gin	Hinsdale	.9351	49.65	0.013		Slight	0.05		
348	Rum	Chesterfield	.9501	41.14	0.052	2.4	None	0.75	Natural	Low in alcohol; not straight rum.
349	College Club Rye Whiskey	Marlow	.9513	40.38	0.207	5.0	Marked.	3.0	Largely artificial	Low in alcohol; not straight whiskey.
351	Rum	Winchester	.9377	48.31	0.148		Slight	1.5	Natural	
352	Rum	Stoddard	.9467	43.19	0.087	4.0	Marked	1.5	Largely artificial	Not straight rum.
353	Whiskey	Gilsum	.9437	45.80	0.314	7.2	Slight.	4.0	Largely artificial	Not straight whiskey.
354	Rum	Chesterfield	.9619	32.85	0.114	4.8	Slight	1.5	Natural	Watered.
355	Whiskey	Chesterfield	.9633	33.42	0.708	7.2	Mod	3.5	Artificial	Watered and sweetened.
356	Whiskey	Winchester	.9509	36.46	1.129	8.0	Marked	4.0	Largely artificial	Watered, artificially colored and sweetened.
357	Jamaica Rum	Gilsum	.9443	37.76	0.247	8.0	Marked	5.0	Largely artificial	Watered.
358	Rum	Manchester	.9510	41.92	0.256	4.0	None	2.5	Largely artificial	Low in alcohol; not straight rum.
359	Rum	Manchester	.9399	47.10	0.099	8.8	None	1.7	Natural	
360	Rum	Manchester	.9329	50.87	0.048	8.8	Slight	0.3	Natural	

361	Whiskey	Manchester	.9555	37.84	0.212	4.8	None	4.0	Artificial	Watered; not straight whiskey.
362	Whiskey	Manchester	.9473	44.00	0.363	9.0	Marked	5.0	Largely artificial	
363	Whiskey	Manchester	.9554	37.62	0.176	3.2	None	5.0	Artificial	Artificial; low in alcohol.
364	Rum	Manchester	.9488	41.94	0.109	4.0	Slight	2.5	Artificial	Low in alcohol; not straight rum.
366	Whiskey	Manchester	.....	46.02	0.690	9.0	Marked	4.0	Artificial	Sweetened and colored.
367	Whiskey	Manchester	.9494	41.60	0.490	5.6	V. slight	5.0	Artificial	Low in alcohol; not straight whiskey.
368	Old Rum	Manchester	.9437	44.70	0.225	10.2	Marked	2.5	Natural	Probably genuine.
369	Gin	Manchester	.9428	45.49	0.135	5.6	Slight	0.15		
370	Rum	Manchester	.9430	45.35	0.164	8.8	None	4.0	Artificial	
371	Rum	Manchester	.9435	45.06	0.130	9.6	Mod	1.7	Largely artificial	
372	Rum	Manchester	.....	34.88	0.086	3.2	Slight	1.5	Artificial	Watered; not straight rum.
373	Gin	Manchester	.9848	49.81	0.017	2.4	None	0.05		
374	Gin	Manchester	.9594	34.75	0.047	1.6	Slight	0.00		Watered.
375	Gin	Manchester	.9850	49.71	0.016	2.4	Slight	0.00		
376	Gin	Manchester	.9397	48.68	0.297	5.0	None	0.10		
377	Gin	Manchester	.9524	39.68	0.010	1.2	Slight	0.10		Alcohol low.
378	Gin	Manchester	.9430	45.37	0.137	1.6	None	0.05		
379	Whiskey	Manchester	.9443	46.50	0.220	12.0	Marked	3.5	Natural	Probably genuine.
380	Whiskey	Manchester	.9434	45.86	0.357	4.0	None	3.0	Artificial	Not straight whiskey.
381	Whiskey	Manchester	.9445	45.30	0.812	5.0	Slight	4.5	Artificial	High solid residue; not straight whiskey.
382	Gibson's Rye Whiskey	Manchester	.9434	44.94	0.282	7.2	Marked	4.0	Largely artificial	
400	Gin	Keene	.9589	38.66	0.021	1.6	Slight	0.00		Low in alcohol.
401	Gin	Keene	.9341	50.31	0.008	4.0	None	0.05		
402	Gin	Keene	.9344	50.13	0.010	2.0	None	0.05		
403	Whiskey	Keene	.9583	39.08	0.143	3.2	None	4.0	Artificial	Low alcohol; not straight whiskey.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 c.c. No. c.c. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
404	Whiskey	Keene	.9426	45.62	0.164	4.0	None	5.0	Artificial	Not straight whiskey.
405	Whiskey	Keene	.9442	44.20	0.238	4.0	Mod	4.5	Largely artificial	Not straight whiskey.
406	Whiskey	Keene	.9440	44.40	0.476	7.2	Marked	4.5	Largely artificial	
407	Whiskey	Keene	.9582	39.52	0.603	3.0	None	4.5	Artificial	Low alcohol; high solid residue; doctored.
408	Whiskey	Keene	.9448	45.50	0.631	3.0	Marked	4.0	Largely artificial	High solids; not straight whiskey.
409	Whiskey	Keene	.9497	41.38	0.184	4.0	Mod	4.0	Largely artificial	Low in alcohol; not straight whiskey.
410	Whiskey	Keene	.9517	40.40	0.476	8.0	Marked	4.5	Largely artificial	Low in alcohol.
411	Rum	Keene	.9340	52.20	1.104	3.0	None	3.0	Artificial	Wholly artificial preparation.
412	Rum	Keene	.9341	50.26	0.142	5.6	Slight	4.5	Artificial	Not straight rum.
413	Rum	Keene	.9506	40.82	0.131	4.0	None	4.0	Artificial	Not straight rum.
414	Rum	Keene	.9584	39.00	0.076	2.0	None	1.5	Artificial	Wholly artificial; low in alcohol.
415	Rum	Keene	.9447	45.20	0.452	8.0	Mod	3.5	Artificial	
416	Rum	Keene	.9479	42.49	0.143	8.0	Marked	3.5	Partly artificial	Low in alcohol; not straight rum.
417	Rum	Keene	.9443	44.62	0 128	8.0	Marked	1.7	Partly artificial	
424	Whiskey	Keene	.9442	44.32	0.556	.....	Slight	....	.....	
425	Whiskey, Paul Jones	Keene	.9517	40.08	0.168	.....	Slight	....	.....	Low in alcohol.
426	Whiskey	Keene	.9420	46.04	0.274	12.0	Marked	5.0	.....	Probably genuine.
427	Whiskey	Keene	.9526	43.00	0.812	5.5	Slight	5.0	.....	High solid residue; not straight whiskey.

428	Whiskey	Keene	.9433	46.16	0.846	18.0	Mod	6.5		High solid residue.
429	Whiskey	Greenville	.9485	42.10	0.130	12.0	Marked	6.0		Low in alcohol.
430	Whiskey	Greenville	.9477	43.70	0.450	9.0	Mod	5.5		
431	Whiskey	Greenville	.9569	36.60	0.166		None			Watered; not straight whiskey.
432	Whiskey	Greenville	.9459	43.96	0.218	5.0	Mod	5.0		Not straight whiskey.
433	Whiskey	New Ipswich	.9584	39.84	0.440	4.0	Slight			Not straight whiskey.
434	Gin	Keene	.9363	49.00	0.067	1.0	None	0.2		
435	Gin	Greenville	.9345	49.96	0.003	1.0	None	0.2		
436	Gin	Keene	.9389	50.34	0.007	4.5	Slight	0.2		
437	Rum	Greenville	.9563	36.99	0.172	6.5	Mod	5.0		Watered.
438	Rum	Keene	.9447	44.88	0.171	8.5	Mod	2.5		
439	Rum	Greenville	.9472	42.88	0.171	6.5	Mod	5.0		Low in alcohol.
440	Rum	Greenville	.9556	39.90	0.254	4.5	Mod	2.5		Low in alcohol; not straight rum.
441	Rum	Keene	.9357	49.35	0.130	9.0	Mod	2.0		
442	Rum	Greenville	.9518	40.00	0.118	2.5	Slight	3.0		Artificial; low in alcohol.
443	Rum	Keene	.9347	49.85	0.030	7.0	Heavy	2.5		
444	Rum	New Ipswich	.9499	41.25	0.187	5.0	Slight			Low in alcohol.
450	Gin	Raymond	.9453	44.02	0.028	1.0	Slight	0.2		
451	Gin	Candia	.9520	39.91	0.016	1.0	Slight	0.2		
452	Gin	Nashua	.9390	48.50	0.360	3.0	None	0.2		
453	Gin	Nashua	.9451	44.16	0.038	2.0	None	0.4		
454	Gin	Nashua	.9412	46.41	0.013		None			
455	Gin	Nashua	.9397	47.22	0.023	3.0	Slight	0.3		
456	Gin	Merrimack	.9552	37.78	0.040	1.5	Slight	0.4		Low in alcohol.
457	Gin	Nashua	.9559	37.26	0.104	1.0	Slight	0.3		Low in alcohol.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at.	Specific gravity.	Alcohol per cent. by vol.	Solids.	Acidity in 100 c.c. No. c.c. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
458	Whiskey	Nashua	.9422	45.80	0.145	7.5	Mod	4.0		
459	Whiskey	Nashua	.9444	44.58	0.127		Mod			
460	Whiskey	Nashua	.9442	44.70	0.141		Slight			
461	Whiskey	Nashua	.9449	44.24	0.148		Slight			
462	Whiskey	Merrimack	.9544	38.31	0.156	2.5	Slight	4.5		Artificial; low alcohol.
463	Whiskey	Merrimack	.9540	39.58	0.570	7.5	Mod	6.0		Alcohol low.
464	Whiskey	Raymond	.9507	40.69	0.110		None			Alcohol low.
465	Whiskey	Candia	.9517	41.40	0.472		None			Alcohol low.
466	Whiskey	Nashua	.9470	43.00	0.162		Slight			Alcohol low.
467	Whiskey	Nashua	.9437	45.28	0.288		None			
468	Whiskey	Merrimack	.9431	46.64	0.622	7.0	Mod	6.5		High solid residue.
469	Whiskey	Nashua	.9437	45.52	0.430	5.5	Slight	7.5		Not straight whiskey.
470	Rum	Merrimack	.9434	45.82	0.398	4.5	None	2.5		Not straight rum.
471	Rum	Merrimack	.9342	50.21	0.084		None			
478	Whiskey	Manchester	.9453	44.70	0.550					
479	Whiskey	Manchester	.9443	45.20	0.400	4.5	Mod	6.0		Not straight whiskey.
480	Whiskey	Manchester	.9510	41.00	0.190	3.5	Mod	4.0		Low alcohol; not straight whiskey.
481	Whiskey	Manchester	.9584	36.20	0.140		None	3.0		Not straight whiskey; alcohol low.
482	Whiskey	Manchester	.9433	46						[whiskey. not straight
			.9433	46.94	0.616	5.5	Slight	6.5		High solid residue; not

483	Whiskey	Manchester	.9427	45.92	0.460	6.0	Mod	5.5		
484	Rye Whiskey	Manchester	.9423	47.48	0.560	6.0	Mod	6.5		
485	Van Hock Whiskey	Manchester	.9458	44.70	0.648					High solid residue.
486	Whiskey	Manchester	.9524	41.58	0.692					Low alcohol; high solid residue.
487	Gibson Whiskey	Manchester	.9385	48.28	0.148					
488	Pat Hand Whiskey	Manchester	.9482	43.88	0.492	4.0	Mod			Not straight whiskey.
489	Whiskey	Manchester	.9434	45.60	0.210					
491	Rum	Manchester	.9561	37.62	0.168	8.0	None	8.0		Not genuine rum; alcohol low.
492	Gin	Manchester	.9513	40.32	0.048	8.5	Slight	0.5		
493	Gin	Manchester	.9472	42.58	0.364	1.5	None	0.1		
494	Gin	Manchester	.9574	36.22	0.082	4.0	Mod	0.3		Watered.
506	G. O. Blake Rye Whiskey	Manchester	.9459	43.56	0.423	4.5	Mod	6.0		Not straight whiskey.
507	Whiskey	Manchester	.9429	45.20	0.208	7.0	Heavy	5.0		
508	Whiskey	Manchester	.9493	44.24	1.470	6.5	Mod	4.5		
509	Whiskey	Manchester	.9429	45.42	0.170					
510	Whiskey	Manchester	.9553	37.72	0.120					Watered.
511	Bowen's Rye Whiskey	Manchester	.9463	43.48	0.464	10.0	Mod	4.0		
512	Whiskey	Manchester	.9575	36.18	0.132	2.5	Slight	4.5		Artificial; alcohol low.
513	Whiskey	Manchester	.9437	44.98	0.128					
514	Whiskey	Manchester	.9508	40.62	0.144					Alcohol low.
515	Whiskey	Manchester	.9598	34.85	0.122					Watered.
516	Whiskey	Manchester	.9551	37.86	0.132					Watered.
517	Whiskey	Manchester	.9483	45.18	0.152					
518	Whiskey	Manchester	.9543	38.40	0.124					Watered.
519	Nelson Rye Whiskey	Manchester	.9434	45.70	0.384	10.0	Heavy	4.5		Probably genuine.
520	Whiskey	Manchester	.9471	42.96	0.136					Alcohol low.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 cc. No. cc. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
521	Whiskey	Manchester	.9407	46.65	0.140	6.0	Heavy	4.0		
522	Cognac Brandy	Manchester	.9441	48.60	1.040					Sweetened.
523	Rum	Manchester	.9553	37.72	0.092					Watered.
524	Rum	Manchester	.9490	41.79	0.108					Alcohol low.
525	Rum	Manchester	.9587	35.32	0.080					Watered.
526	Rum	Manchester	.9569	36.57	0.068	6.5	Slight	1.5		Watered.
527	Rum	Manchester	.9426	46.84	0.684	14.0	Mod	5.0		
528	Rum	Manchester	.9562	37.10	0.300	4.5	Mod	2.0		Watered; not straight rum.
529	Rum	Manchester	.9568	36.66	0.068	1.5	Slight	2.0		Made from neutral spirits; alcohol low.
530	Gin	Manchester	.9562	37.08	0.040	1.0	None	0.1		Alcohol low.
531	Gin	Manchester	.9578	35.97	0.006	1.0	Slight	0.3		Alcohol low.
532	Gin	Manchester	.9581	35.74	0.015	1.0	None	0.1		Alcohol low.
533	Gin	Manchester	.9602	34.16	0.036	1.0	None	0.05		Watered.
534	Gin	Manchester	.9526	39.48	0.060	7.0	Heavy	0.75		Alcohol low.
571	Whiskey	Manchester	.9482	42.80	0.580	8.0	Slight	3.5		Alcohol low.
572	Whiskey	Manchester	.9567	37.56	0.248					Watered.
573	Whiskey	Manchester	.9437	45.80	0.460					
574	O. F. C. Whiskey	Manchester	.9449	45.22	0.372					
575	Whiskey	Manchester	.9566	37.76	0.128					Watered.

576	Whiskey	Manchester	.9456	45.10	0.570	8.5	Heavy	5.0		
577	Whiskey	Manchester	.9429	46 50	0.650					High solid residue.
578	Whiskey	Manchester	.9434	45.22	0.528	5.0	Slight	5.0		Not straight whiskey.
579	Whiskey	Manchester	.9517	40.50	0.172	5.0	Slight	5.0		Not straight whiskey; alcohol low.
580	Melvah Whiskey	Manchester	.9441	44.92	0.588	6.5	Slight	6.0		
581	Whiskey	Manchester	.9453	44.05	0.200					
582	Whiskey	Manchester	.9385	48.00	0.228	7.0	Heavy	5.5		
583	Rosemont Whiskey	Manchester	.9451	44.32	0.370					
584	Whiskey	Manchester	.9434	43.64	0.576					
585	Whiskey	Manchester	.9445	44.53	0.128	3.5	Mod	4.5		Not genuine whiskey.
586	Whiskey	Manchester	.9429	45.80	0.336					
587	Diamond Rye Whiskey	Manchester	.9564	37.76	0.228	4.0	Slight	5.0		Not straight whiskey; alcohol low.
588	Whiskey	Manchester	.9420	45.95	0.152					
589	Herculian Whiskey	Manchester	.9527	40.98	0.856	6.5	Mod	4.5		Compounded; alcohol low.
590	Whiskey	Manchester	.9443	44.60	0.136					
591	Antler Rye Whiskey	Manchester	.9366	49.70	1.090	12.5	Heavy	7.0		Sweetened.
592	Whiskey	Manchester	.9388	48.36	0.216	6.0	Mod	6.0		
593	Whiskey	Manchester	.9439	46.00	0.676	7.0	Heavy	5.0		High solid residue.
594	Whiskey	Manchester	.9431	46.04	0.660	8.5	Heavy	5.0		High solid residue.
595	Harper Whiskey	Manchester	.9447	44 98	0.600					High solid residue.
596	Whiskey	Manchester	.9442	45.80	0.648	6.0	Mod	6.0		High solid residue.
597	Whiskey	Manchester	.9595	34.70	0.210	4.5	None	4.0		Artificial; alcoholic strength low.
598	Gin	Manchester	.9448	44.29	0.008	1.5	Slight	0.1		
599	Gin	Manchester	.9656	38.90	3.460	1.5	Slight	0.05		Alcohol low; heavily sweetened.
600	Gin	Manchester	.9532	39.12	0.037	2.5	Slight	0.30		Alcohol low.
602	Rum	Manchester	.9599	34.38	0.130					Watered.

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 c.c. No. c.c. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
603	Rum	Manchester	.9446	44.46	0.114					
604	Rum	Manchester	.9561	37.14	0.090					Watered.
605	Gin	Manchester	.9554	37.65	0.009	1.0	Slight	0.1		Alcohol low.
606	Gin	Manchester	.9524	39.67	0.002	1.0	Slight	0.05		
607	Gin	Manchester	.9339	50.25	0.008	3.0	Slight	0.2		
608	Gin	Manchester	.9559	37.47	0.002	0.5	None	0.5		Alcohol low.
609	Whiskey	Manchester	.9434	45.90	0.555					
610	Whiskey	Manchester	.9428	46.80	0.942					Sweetened.
611	Whiskey	Manchester	.9567	36.71	0.110					Watered.
612	Whiskey	Manchester	.9442	44.56	0.355					
613	Whiskey	Manchester	.9458	44.10	0.615					High solid residue.
614	Whiskey	Manchester	.9454	45.16	0.925					High solid residue.
615	Whiskey	Manchester	.9420	47.04	0.985	9.0	Mod	5.0		High solid residue.
616	Whiskey	Manchester	.9429	45.40	0.180	10.0	Heavy	5.0		
617	Whiskey	Manchester	.9473	43.80	0.645					High solid residue.
618	Whiskey	Manchester	.9436	45.40	0.330					
619	Whiskey	Manchester	.9562	37.08	0.182					Watered.
620	Whiskey	Manchester	.9447	48.50	2.230	6.0	Heavy	2.0		Heavily sweetened.
621	Whiskey	Manchester	.9579	35.86	0.205	1.0	None	7.0		Made from neutral spirits; alcohol low.

622	Whiskey	Manchester	.9432	45.80	0 350	4.5	Mod	6.0		Not straight whiskey.
623	Whiskey	Manchester	.9438	45.10	0.340					
624	Whiskey	Manchester	.9441	44.72	0.130					
625	Whiskey	Manchester	.9455	45.20	0.570					
626	Whiskey	Manchester	.9579	35.85	0.185					Watered.
627	Whiskey	Manchester	.9451	45.20	0.390					
628	Whiskey	Manchester	.9407	46.62	0.210					
629	Whiskey	Manchester	.9465	43.62	0.330	2 0	Slight	3.0		Not straight whiskey.
630	Whiskey	Manchester	.9601	34.20	0.120	2.5	Slight	6 0		Artificial; alcoholic strength low.
631	Whiskey	Manchester	.9444	45.02	0.280	4.5	Slight	4.5		Not straight whiskey.
632	Whiskey	Manchester	.9594	34.80	0.142					Watered.
633	Whiskey	Manchester	.9560	37.80	0.215					Watered.
634	Whiskey	Manchester	.9490	42.26	0.220	4.5	Mod	5.0		Not straight whiskey; low in alcohol.
635	Whiskey	Manchester	.9436	45.00	0.510	6.0	Mod	4.5		
636	Whiskey	Manchester	.9433	45.60	0.710	6.0	Mod	6.0		High solid residue.
637	Whiskey	Manchester	.9433	45.80	0.542	6.5	Mod	5.5		
638	Whiskey	Manchester	.9555	37.38	0.165	6.0	Mod	5.5		Low in alcohol.
639	Whiskey	Manchester	.9440	45.54	0.732	5.5	None	5.0		High solids; not straight whiskey.
640	Whiskey	Manchester	.9426	45.98	0.350	6.5	None	5.0		
641	Whiskey	Manchester	.9579	35.88	0.121	1.0	None	4.5		Entirely artificial; alcoholic strength low.
642	Whiskey	Manchester	.9440	44.98	0.355	4.5	None	5.0		Not straight whiskey.
643	Whiskey	Manchester	.9490	42.60	0.435	4.5	None			Alcohol low.
644	Rum	Manchester	.9529	39.28	0.095	3.0	Slight	4.0		Alcohol low; not straight rum.
645	Rum	Manchester	.9542	38.45	0.095	4.5	Slight	2.5		Alcohol low.
646	Rum	Manchester	.9549	37.96	0.121	2.5	None	3.0		Alcohol low; artificial.
647	Rum	Manchester	.9827	50.50	0.070	6.5	Mod	2.0		

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Continued.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol per cent. by vol.	Solids.	Acidity in 100 c.c. No. c.c. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
648	Gin	Manchester	.9513	40.37	0.008	1.0	None	0.2		
649	Gin	Manchester	.9556	37.50	0.008	1.5	Mod	0.10		Alcohol low.
650	Gin	Manchester	.9564	36.95	0.030	1.6	Slight	0.10		Watered.
651	Gin	Manchester	.9579	35.85	0.045	1.0	Slight	0.1		Watered.
652	Gin	Manchester	.9528	39.40	0.008	1.5	Slight	0.05		
653	Old Miller Rye Whiskey	Berlin	.9437	45.00	0.310	8.0	Heavy	4.5		
654	Atherton Whiskey	Berlin	.9436	46 02	0.183	3.0	Mod	4.0		Not straight whiskey.
655	Horseshoe Whiskey	Berlin	.9495	42 00	0.650					High solid residue; low alcohol.
656	Live Oak Whiskey	Berlin	.9493	42.60	0.710	6.5	Mod			High solid residue; low alcohol.
657	Covington Rye Whiskey	Berlin	.9486	42.50	0.630	2.5	Slight	5.0		Artificial.
658	Davis & Drake Whiskey	Berlin	9497	42.48	0.680	2.5	None	5.0		Artificial.
660	Gin	Newfields	.9579	35.88	0.172	1.5	Slight	0.2		Watered.
661	Gin	Newfields	.9450	45.96	0.773	1.5	Slight	0.1		High solid residue.
662	Gin	Newfields	.9482	42.26	0.013	1.0	Slight	0.05		
663	Gin	Newfields	.9481	42.28	0.010	1.0	Slight	0.1		
664	Gin	Newmarket	.9450	44.20	0.027	2.5	Slight	0.2		
665	Gin	Newmarket	.9410	46.48	0.026	2.0	Slight	0.2		
666	Gin	Newmarket	.9426	45.60	0.012	1.0	None	0.05		
667	Gin	Newmarket	.9432	45.22	0.013	1.0	None	0.1		

668	Gin	Newmarket	.9546	38.18	0.047	1.0	None	0.1		Alcohol low.
669	Gin	Newmarket	.9451	44.12	0.008					
670	Gin	Newmarket	.9577	38.24	3.387	1.5	Slight	0.05		Alcohol low; heavily sweetened.
671	Gin	Newmarket	.9614	38.14	2.010	0.5	Slight	0 05		Alcohol low; heavily sweetened.
672	Whiskey	Newfields	.9450	45.44	0.722					High solid residue.
673	Whiskey	Newmarket	.9388	47.68	0.147	3.0	Slight	4.0		Not straight whiskey.
674	Whiskey	Newmarket	.9434	45.62	0.550					
675	Whiskey	Newmarket	.9478	42.53	0.177					Low alcohol.
676	Whiskey	Newmarket	.9458	45.02	0.620					High solid residue.
677	Whiskey	Newmarket	.9451	45.80	0.700	4.5	Mod	6.0		High solid residue; not straight whiskey.
678	Whiskey	Newmarket	.9448	44.81	0.167					
679	Whiskey	Newmarket	.9429	46.34	0.330					
680	Whiskey	Newmarket	.9448	46.10	0.720					High solid residue.
681	Whiskey	Newfields	.9447	45.90	0.682					High solid residue.
682	Whiskey	Newfields	.9431	46.24	0.470					
683	Whiskey	Newfields	.9541	39.80	0.365	4.5	Mod	7.0		Low alcohol; not straight whiskey.
684	Gin	Portsmouth	.9328	50.80	0.028	4.0	Slight	0.4		
685	Gin	Portsmouth	.9524	45.60	2.780	1.0	None	0.05		Heavily sweetened.
686	Gin	Portsmouth	.9360	49.00	1.070	2.5	Mod	0.20		Sweetened.
687	Gin	Portsmouth	.9524	45.94	2.810	3.0	None	0.05		Heavily sweetened.
688	Gin	Portsmouth	.9337	50.85	0.047	3.0	None	0.05		
689	Gin	Portsmouth	.9345	50.15	0.048	3.0	None	0.3		
690	Gin	Portsmouth	.9421	45.90	0.010	3.0	None	0.1		
691	Gin	Portsmouth	.9413	46.30	0.015	1.0	Slight	0.05		
692	Gin	Portsmouth	.9325	50.95	0.036	2.5	Slight	0.1		
693	Gin	Portsmouth	.9517	40.10	0.110	3.0	Slight	0.3		

RESULTS OF ANALYSES OF DISTILLED LIQUORS.—*Concluded.*

Number.	Brand.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Solids.	Acidity in 100 cc. No. cc. n-10 alkali.	Tannin.	Color.*	Character of color.	Remarks and conclusions.
694	Whiskey	Portsmouth	.9537	38.78	0.107					Alcohol low.
695	Whiskey	Portsmouth	.9427	46.62	0.415					
696	Whiskey	Portsmouth	.9253	54.50	0.222					
697	Whiskey	Portsmouth	.9440	44.80	0.176					
698	Whiskey	Portsmouth	.9436	46.74	0.895	11.5	Heavy	6.0		High solid residue.
699	Whiskey	Portsmouth	.9360	49.20	0.200					
700	Whiskey	Portsmouth	.9341	50.20	0.177					
701	Whiskey	Portsmouth	.9442	45.00	0.400					
702	Whiskey	Portsmouth	.9493	42.14	0.360		Mod	5.0		Low alcohol.
703	Whiskey	Portsmouth	.9454	45.90	0.970					High solid residue.
704	Whiskey	Portsmouth	.9438	45.10	0.255					
705	Rum	Portsmouth	.9447	44.10	0.210					
728	Whiskey	Berlin	.9503	40.98	0.158					Low alcohol.
729	Hanover Rye Whiskey	Salmon Falls	.9372	49.60	0.566	10.4	Marked	6.5	Largely artificial	
730	Hanover Rye Whiskey	Rochester	.9448	45.00	0.376	6.4	Slight	6.0	Largely artificial	Not straight whiskey.
752	Old Fashioned Mayfair Whiskey	Laconia	.9435	45.07	0.128	4.0	Slight			Largely artificial.

RESULTS OF ANALYSES OF MALT LIQUORS.

Number.	Brand.	Manufacturer.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Extract, per cent.	Remarks.
269	Bowler Bros.' Stock Ale	Bowler Bros., Worcester, Mass.	Manchester	1.0085	5.30	4.16	Preserved with salicylic acid.
270	Ale	T. W. Jones Brewing Co., Manchester.	Manchester	1.0058	5.32	3.55	
271	Bowler Bros.' Ale	Bowler Bros., Worcester, Mass.	Manchester	1.0046	5.66	3.28	Preserved with salicylic acid.
272	Ale	Eldridge Brewing Co., Portsmouth	Manchester	1.0108	6.52	5.45	
273	Lager Beer	Portsmouth Brewing Co., Portsmouth.	Manchester	1.0116	4.67	4.74	
293	Ale	Harvard Brewing Co., Lowell, Mass.	Manchester	1.0192	4.94	6.80	
294	Lager Beer		Manchester	1.0161	4.80	5.94	
295	Lager Beer, Fischer's	Herbert Fischer Brewery, Hartford, Conn.	Hinsdale	1.0137	4.78	5.33	
296	Brilliant Ale	Herbert Fischer Brewery, Hartford, Conn.	Hinsdale	1.0109	5.50	4.88	
297	Ballantine's Extra Porter	Ballantine & Sons, Newark, N. J.	Hinsdale	1.0219	5.56	7.66	
298	Harvard Lager Beer	Harvard Brewing Co., Lowell, Mass.	Manchester	1.0114	5.31	4.93	
299	Sterling Ale		Manchester	1.0121	6.60	5.55	
300	Zeltner Lager Beer	Zeltner Brewing Co.	Manchester	1.0122	4.15	4.71	Preserved with salicylic acid.
301	True Jones' Lager Beer	T. W. Jones Brewing Co., Manchester.	Manchester	1.0075	5.71	4.05	Preserved with salicylic acid.
302	Stock Ale		Manchester	1.0138	5.51	5.60	
303	Burkhardt's Ale	Burkhardt's Brewing Co., Boston	Hinsdale	1.0127	3.65	4.69	
304	Stock Ale		Manchester	1.0149	5.42	5.87	
305	Ale		Manchester	1.0129	5.50	5.38	
888	Sparkling Ale		Manchester	1.0145	4.64	5.50	

RESULTS OF ANALYSES OF MALT LIQUORS.—*Continued.*

Number.	Brand.	Manufacturer.	Collected at	Specific gravity.	Alcohol, per cent. by vol.	Extract, per cent.	Remarks.
389	Stock Ale	.....	Manchester	1.0160	5.25	6.07	
390	Weiner Lager	Cold Springs Brewing Co	Manchester	1.0193	4.86	6.80	
391	Lager Beer	Schlitz Brewing Co., Milwaukee, Wis.	Manchester ...	1.0129	4.56	5.06	
392	Sterling Ale	.....	Manchester	1.00572	7.75	4.23	
419	Lager Beer	Providence Brewing Co., Providence, R. I.	Keene.....	1.0168	4.49	6.02	
420	Lager Beer	Colonial Brewing Co	Keene.....	1.0180	4.30	6.26	
421	Lager Beer	Roessle Brewing Co	Keene.....	1.0131	4.95	5.25	
422	Souther Stock Ale	Souther Brewing Co., Boston	Keene....	1.0095	5.76	4.58	
423	Alley's Ale	Eblana Brewery, Boston	Keene....	1.0044	6.75	3.56	
477	Lager Beer	Narragansett Brewing Co	New Ipswich...	1.0122	5.58	5.25	
497	Cold Spring Ale	Cold Spring Brewing Co	Manchester ...	1.0147	5.15	5 72	
498	Pale Ale	True Jones Brewing Co., Manchester..	Manchester	1.0087	5.65	4.34	Preserved with salicylic acid.
499	Ale	Park Brewing Co	Manchester	1.0078	5.75	4.13	
500	Bartholomay Lager Beer	Bartholomay Brewery Co., Rochester, N. Y.	Manchester	1.0096	6.79	4.98	Preserved with a fluoride.
501	Cream Ale	True Jones Brewing Co., Manchester..	Manchester	1.0031	5.90	2.97	Preserved with salicylic acid.
502	Dark Ale	True Jones Brewing Co., Manchester..	Manchester	1.0123	5.11	5.12	Preserved with salicylic acid.
503	Porter	True Jones Brewing Co., Manchester..	Manchester	1.0114	5.86	5.15	Preserved with salicylic acid.
504	Union Lager Beer	.....	Manchestsr	1.0176	4.56	6.19	
505	Lager Beer	True Jones Brewing Co., Manchester..	Manchester ...	[illegible]	5.08	4.03	Preserved with salicylic acid.

541	Miller Lager Beer	Miller Brewing Co., Milwaukee, Wis.	Manchester	1.0168	5.02	6.08	
542	Ale	Starr Brewing Co.	Manchester	1.0090	6.81	4.79	
543	Sparkling Ale		Manchester	1.0140	5.08	5.58	
544	Frank Jones Ale	Frank Jones Brewing Co., Portsmouth	Manchester	1.0123	6.01	5.40	
545	Union Lager Beer		Manchester	1.0179	4.53	6.31	
546	Ballantine's Ale	P. Ballantine & Sons., Newark, N. J.	Manchester	1.0181	5.91	6.85	Preserved with salicylic acid; not brewed wholly from malt, as claimed.
547	Pabst Lager Beer	Pabst Brewing Co., Milwaukee, Wis.	Manchester	1.0166	4.15	5.87	
548	Ale	Eldridge Brewing Co., Portsmouth	Manchester	1.0093	5.55	4.82	
549	Hampton Ale	Springfield Brewing Co., Springfield, Mass.	Manchester	1.0092	6.46	4.74	
550	Half-Stock Ale		Manchester	1.0163	4.55	5.92	
552	Ale		Manchester	1.0115	5.52	5.04	
553	Lager Beer	Frank Jones Brewing Co., Portsmouth	Berlin	1.0088	6.45	4.66	
554	Lager Beer	Miller Brewing Co., Milwaukee, Wis.	Berlin	1.0172	5.02	6.29	
562	Milwaukee Lager Beer	Blatz Brewing Co., Milwaukee, Wis.	Berlin	1.0138	4.58	5.30	
563	Export Lager Beer	Blatz Brewing Co., Milwaukee, Wis.	Berlin	1.0138	5.00	5.48	
564	Buffet Lager Beer	Miller Brewing Co., Milwaukee, Wis.	Berlin	1.0165	4.95	6.11	
565	Schlitz Lager Beer	Schlitz Brewing Co., Milwaukee, Wis.	Berlin	1.0184	3.88	6.21	
566	Sparkling Ale	Portsmouth Brewing Co., Portsmouth.	Berlin	1.0084	6.17	4.44	
567	Portsburger Lager Beer	Portsmouth Brewing Co., Portsmouth.	Berlin	1.0165	4.65	6.80	
568	Half-Stock Ale	Portsmouth Brewing Co., Portsmouth.	Berlin	1.0132	5.60	5.50	
569	P. B. Ale	Van Nostrand Brewing Co., Boston	Berlin	1.0132	7.40	6.07	
706	India Pale Ale	Burkhardt Brewing Co., Boston	Claremont	1.0078	7.05	4.58	100 c.c. contained 5.1 milligrams sulphurous acid
707	Tivoli Beer	Burkhardt Brewing Co., Boston	Claremont	1.0221	4.10	7.28	100 c.c. contained 1. milligrams sulphurous acid.
722	Bowler Bros. Light Ale	Bowler Bros., Worcester, Mass.	Keene	1.0089	5.35	4.03	100 c.c. contained 6.4 milligrams sulphurous acid.
723	Lager	Roessle Bros., Boston	Keene	1.0137	4.93	5.40	[phurous acid. 100 c.c. contained 4.5 milligrams sul-

RESULTS OF ANALYSES OF MALT LIQUORS.—*Concluded.*

Number.	Brand.	Manufacturer.	Collected at	Specific gravity.	Alcohol per cent. by vol.	Extract, per cent.	Remarks.
724	Bock Beer	Roessle Bros., Boston	Keene	1.0154	5.12	5.89	100 c.c. contained 5.9 milligrams sulphurous acid.
725	Bowler Bros.' Dark Ale	Bowler Bros., Worcester, Mass.	Keene	1.0052	6.12	3.59	100 c.c. contained 5.9 milligrams sul.acid; pres.with salicylic acid.
726	Bowler Bros.' Porter	Bowler Bros., Worcester, Mass.	Keene	1.0139	5.60	5.67	100 c.c contained 5.9 milligrams sulphurous acid.
731	Pale Ale	True Jones Brewing Co., Manchester	Manchester	1.0094	4.88	4.42	100 c.c. contained 1.9 milligrams sulphurous acid.
732	Dark Ale	True Jones Brewing Co., Manchester	Manchester	1.0111	4.88	4.88	100 c.c. contained 2.5 milligrams sulphurous acid.
733	Zeltner Lager Beer	Zeltner Brewing Co.	Manchester	1.0138	4.40	5.25	100 c.c. contained 2.5 milligrams sulphurous acid.
734	Lager Beer	True Jones Brewing Co., Manchester	Manchester	1.0101	5.05	4.50	100 c.c. contained 3.2 milligrams sulphurous acid.
735	Porter.	True Jones Brewing Co., Manchester	Manchester	1.0153	5.14	5.87	
736	Hampden Dark Amber Ale	Springfield Brewing Co., Springfield, Mass.	Manchester	1.0126	6.10	5.50	100 c.c. contained 5.9 milligrams sulphurous acid.
737	St. Paul's Pale Export Lager Beer.	American Brewing Co., St. Louis, Mo.	Manchester	1.0154	4.70	5.75	100 c.c. contained 5.0 milligrams sulphurous acid.
738	Hampden Fall Stock Ale	Springfield Brewing Co., Springfield, Mass.	Manchester	1.0108	5.68	4.90	100 c.c. contained 5.8 milligrams sulphurous acid.
740	Gold Medal Tivoli Lager Beer	Springfield Brewing Co., Springfield, Mass.	Manchester	1.0147	4.70	5.57	100 c.c. contained 6.0 milligrams sulphurous acid.
741	Ale	Eldridge Brewing Co., Portsmouth	Manchester	1.0129	6.95	5.84	100 c.c. contained 6.0 milligrams sulphurous acid.
742	Granite State Cream Ale	True Jones Brewing Co., Manchester	Manchester	1.0066	5.78	3.82	100 c.c. contained 5.5 milligrams sulphurous acid.
743	Bowler Bros.' Lager Beer	Bowler Bros., Worcester, Mass.	Manchester	1.0070	6.50	4.16	100 c.c. contained 6.0 milligrams sulphurous acid.
744	Bowler Bros.' Ale	Bowler Bros., Worcester, Mass.	Manchester	1.0098	5.82	4.69	100 c.c. contained 4.8 milligrams sulphurous acid.

Certain facts should be stated in connection with the foregoing report, because they show that the present law is apparently too defective to prevent certain kinds of adulteration, particularly those that constitute a commercial fraud, but are not necessarily injurious to health. As has been stated in the report of the chemist, no legal standard has been fixed for New Hampshire, and the law relating to the adulteration of liquors is indefinite in some directions and absurd in others.

In the matter of malt liquors, upon the discovery of salicylic acid in some of the samples collected, the State Board of License Commissioners issued the following notice:

IMPORTANT.

To Licensees:

We have reason to believe that large quantities of lager beer and ale are being shipped into our state, which contain deleterious substances, poisonous and injurious to health. *Your attention is therefore called to Section 21, Chapter 95, Laws of 1903,* which reads as follows:

SECT. 21. Any commissioner, police officer, constable, special agent, selectman or sheriff may at any time enter upon the premises of a person who is licensed under the provisions of this act, to ascertain the manner in which such person conducts his business, and to preserve order. Such officers may at any time take samples for analysis of any liquor kept on such premises, and the vessels containing such samples shall be sealed on the premises of the vender, and shall remain so sealed until presented to the State Laboratory of Hygiene for analysis. The city or town in which such vender resides shall pay for the samples so taken, if such liquor is found to be of good quality and free from adulteration. If, however, such liquor shall prove to be adulterated with any deleterious drug, substance or liquid which is poisonous or injurious to the health, or if such liquor prove to be other than it purports to be, the licensee shall be fined two hundred dollars, shall forfeit his license and his bond thereon, and such license shall not be renewed for at least three years from the date of its forfeiture.

See, also, Sub-division 1 of Section 17 and Section 14 of said Chapter 95.

CYRUS H. LITTLE,
HENRY W. KEYES,
JOHN KIVEL,
State Board of License Commissioners.

CONCORD, N. H., January 27, 1906.

It may be said in connection with this that the result was apparently very satisfactory, inasmuch as after the distribution of this notice to licensees, with only one or two exceptions this adulterant was not found in samples examined. The presence of sulphurous acid may be due to glucose or sulphured hops used in the manufacture of beer. (See remarks on page 158.)

It is necessary, under a strict interpretation of this law, that whatever adulterants are found must be "deleterious," "poisonous or injurious" to health in order to secure conviction.

As the foregoing work was done exclusively for the State Board of License Commissioners, it did not fall within the province of the State Board of Health to take action in the matter; but it did call to mind that the Pure Food law, so called, chapter 269 of the Public Statutes, on the subject of liquor, contains the following:

SECT. 10. Whoever adulterates, for the purpose of sale, any liquor used or intended for drink, with cocculus indicus, vitriol, grains of paradise, opium, alum, capsicum, copperas, laurel-water, logwood, Brazil wood, cochineal, sugar of lead, or any other substance which is poisonous or injurious to health, or knowingly sells any such liquor so adulterated, shall be fined not exceeding one thousand dollars, or be imprisoned not exceeding one year.

The substance of this section, if not its exact wording, was enacted nearly fifty years ago in this state, and from what remote source it was handed down we are unable to state; but it is one of the absurdities that were sometimes perpetuated in the statutes, inasmuch as not a single substance mentioned is used for the purpose of adulterating liquors at the present time. Under the words "knowingly sell" the retailer has a degree of protection not consistent and probably not intended.

While it is probable that national legislation which goes into effect in January, 1907, will secure to the liquor dealer a better quality of liquors it will not prevent their being blended, adulterated and watered after they have been brought into the state. It is, therefore, evident that some legislation is needed upon this subject.

BACTERIOLOGICAL EXAMINATIONS.

BACTERIOLOGICAL EXAMINATIONS.

A large amount of work has been done at the bacteriological department of the State Laboratory of Hygiene. The examinations for the period covered by this report approximate 5,000 in special work for the detection of disease, while several hundred bacteriological examinations of water supplies for the colon bacillus and other organisms have been made. This latter work was done in connection with the chemical examination of public and private water supplies, the positive results of which are given under "Water Supplies of Towns and Cities" elsewhere in this report.

Some examinations of specimens not classified have also been made, and reports rendered to boards of health or to the persons directly interested.

SPUTUM EXAMINATIONS FOR TUBERCULOSIS.

During the period covered by this report 2,473 examinations of sputum for tubercle bacilli were made: 1,242 for the year ending September 30, 1905, and 1,231 for the year ending September 30, 1906. These examinations represent specimens from 2,313 cases, of which 1,157 were positive. The following tables give the towns from which specimens were received, the results of the examinations and the age and sex of the patients:

SPUTUM EXAMINATIONS, 1905.

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Acworth	1	....	1	..	1	....	....	....	....	....	....	....	....	....	....	1	..	2
Alton	1	....	1	..	..	....	....	....	....	....	....	....	....	1	1	....	..	1
Andover	4	2	2	..	..	1	....	1	....	1	1	....	....	....	3	1	..	5
Antrim	4	1	3	..	..	....	2	1	....	....	....	1	....	....	4	....	..	4
Ashland	14	5	9	..	3	1	5	2	....	2	....	....	....	1	6	8	..	14
Barnstead	3	3	....	..	..	....	....	....	3	....	....	....	....	....	1	2	..	3
Barrington	5	....	5	..	..	2	....	1	....	2	....	....	....	....	3	2	..	5
Bath	3	1	2	..	..	....	....	....	1	....	2	....	....	....	2	1	..	3
Bedford	1	....	1	..	..	....	....	....	....	....	1	....	....	....	1	....	..	1
Belmont	1	....	1	..	..	....	....	....	....	....	1	....	....	....	1	....	..	1
Berlin	15	5	10	..	..	4	6	3	1	....	....	....	....	1	8	7	..	21
Bethlehem	11	5	6	..	..	....	5	3	....	2	....	....	....	1	4	7	..	11
Bristol	3	1	2	..	..	....	....	2	....	1	....	....	....	....	....	3	..	3
Brookline	1	....	1	..	..	....	....	....	....	....	1	....	....	....	....	1	..	1
Campton Village	2	....	2	..	..	1	....	1	....	....	....	....	....	....	1	1	..	2
Canaan	2	1	1	..	1	....	....	1	....	....	....	....	....	....	1	1	..	3
Charlestown	3	2	1	..	..	1	1	1	....	....	....	....	....	....	....	3	..	3
Claremont	10	2	8	..	..	1	2	2	2	2	....	....	....	1	6	4	..	10
Canaan	1	....	1	..	..	....	....	1	....	....	....	....	....	....	....	1	..	1
Colebrook	2	1	1	..	..	1	....	....	....	....	....	....	....	1	1	1	..	2
Concord	137	37	99	1	2	13	29	35	21	16	7	3	1	10	85	52	..	147
Conway	4	1	3	..	..	1	1	....	2	....	....	....	....	....	1	3	..	4
Cornish	1	....	1	..	..	....	....	....	....	....	....	....	....	1	....	1	.	1
Derry	8	3	5	..	..	1	....	3	1	2	1	....	....	....	6	2	..	8
Dover	42	18	24	..	1	5	12	15	2	4	2	1	....	....	17	25	..	45
Durham	1	....	1	..	..	....	....	....	1	....	....	....	....	....	1	....	..	1
Enfield	5	3	2	..	..	....	2	....	1	1	....	1	....	....	3	2	..	6
Epping	2	2	....	..	..	....	1	....	....	....	1	....	....	....	1	1	..	2
Epsom	7	3	4	..	..	....	1	2	....	1	2	1	....	....	2	5	..	7
Exeter	16	8	8	..	..	3	1	7	4	1	....	....	....	....	10	6	..	16
Farmington	11	2	9	..	..	....	5	2	....	1	1	....	....	2	3	7	1	14
Franconia	1	....	1	..	..	....	....	....	....	....	1	....	....	....	1	....	..	1
Franklin	32	10	22	..	2	5	10	7	1	3	3	....	....	1	12	20	..	37
Freedom	1	....	1	..	..	....	1	....	....	....	....	....	....	....	....	1	..	1
Goffstown	1	....	1	..	..	....	....	1	....	....	....	....	..	....	1	....	..	1

SPUTUM EXAMINATIONS, 1905.—*Continued.*

ity or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
own Almshouse..	14	5	9	..	..	1	2	1	1	4	....	3	1	1	3	11	..	15
m.....	1	1	....	..	..	....	1	....	....	....	....	....	....	....	....	1	..	1
ham	5	....	5	..	1	....	1	1	....	2	....	....	...	....	2	3	..	5
field.....	3	1	2	..	..	1	....	2	....	....	....	....	....	....	2	1	..	3
ville.....	9	3	6	..	..	4	3	....	1	....	1	....	....	....	4	5	..	9
ton.....	2	1	1	..	..	....	....	1	1	....	....	....	....	....	1	1	..	2
ton.....	3	2	1	..	..	....	....	....	1	1	1	....	....	....	1	2	..	3
ver.....	39	4	35	..	1	3	13	7	5	3	4	....	....	3	26	13	..	42
hill.....	1	1	....	..	..	....	....	1	....	....	....	....	....	....	1	....	..	1
ker.....	2	1	1	..	..	....	1	1	....	....	....	....	....	....	....	2	..	2
.....	2	....	2	..	..	....	2	....	...	....	....	....	....	....	1	1	..	2
orough.....	8	6	2	..	..	2	2	1	2	1	....	....	....	....	2	6	..	9
ale.....	3	1	2	..	..	....	....	1	2	....	....	....	....	....	1	2	..	4
sett.....	2	1	1	..	..	....	1	...	....	....	....	....	...	1	....	2	..	2
nton.....	2	1	1	..	..	....	....	....	1	....	....	...	1	....	1	1	..	2
on.....	5	1	4	..	..	....	....	....	1	1	2	....	....	1	2	3	..	5
.....	40	5	35	..	..	6	9	10	3	2	5	2	1	2	17	23	..	42
ia.....	22	7	15	..	..	3	5	6	5	2	1	....	....	....	7	15	..	23
ster..... ...	22	7	15	..	1	3	9	2	3	2	2	....	....	....	11	11	..	23
ion	31	7	24	..	1	2	9	6	5	4	2	1	....	1	13	18	..	41
ster.....	3	....	3	..	..	....	1	2	..	....	....	....	....	....	2	1	..	3
n.....	3	2	6	..	..	....	1	2	4	1	....	...	....	....	2	6	..	8
ton.....	31	8	23	..	1	7	7	6	4	3	3	....	....	....	17	14	..	34
nderry.....	1	....	1	..	..	..	....	1	....	....	....	....	....	...	....	1	..	1
on.....	2	1	1	..	..	....	....	1	....	....	1	...	....	....	1	1	..	2
.....	5	2	3	..	..	....	3	1	....	....	1	....	....	....	1	4	..	5
on.....	1	....	1	..	..	....	1	....	....	....	....	....	....	....	....	1	..	1
hester.....	183	82	101	..	3	22	64	44	18	14	6	2	1	9	88	95	..	190
w.....	1	....	1	..	..	....	....	....	....	....	....	....	....	1	....	1	..	1
d.....	9	....	9	..	..	1	2	1	....	2	...	3	....	....	2	7	..	11
n.....	1	....	1	..	..	....	....	....	....	....	....	....	..	1	....	....	1	1
t Vernon.....	1	1	....	..	..	....	1	....	....	....	....	....	....	....	1	....	..	1
ia.....	64	24	40	..	1	6	20	20	10	3	2	....	....	2	26	38	..	70
Boston..... ..	1	....	1	..	..	....	....	....	....	1	...	....	....	.. ..	....	1	..	1
Hampton....	2	1	1	..	..	....	1	....	1	....	....	....	....	....	....	2	..	2

SPUTUM EXAMINATIONS, 1905—*Concluded.*

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of cases examined.
New Ipswich	1	....	1	..	..	....	....	....	....	....	....	1	....	....	....	1	..	1
Newmarket	1	....	1	..	..	....	1	....	....	....	....	....	...	....	....	1	..	1
Newport	6	2	4	..	1	1	2	1	....	....	....	....	....	1	2	4	..	6
Northwood	6	1	5	..	..	....	5	....	....	....	....	1	....	....	3	3	..	7
Nottingham	1	....	1	..	..	....	....	....	1	....	....	....	....	....	....	1	..	1
Orford	1	....	1	..	..	1	....	....	....	....	....	....	....	....	....	1	..	1
Ossipee	1	....	1	..	..	....	....	1	....	....	....	....	....	....	....	1	..	2
Pembroke	*62	42	20	..	6	16	10	3	....	....	....	....	....	27	36	26	..	66
Peterborough	8	1	7	..	1	1	1	4	1	....	....	....	....	....	2	6	..	8
Pittsfield	16	3	13	..	3	4	....	2	3	1	1	1	....	1	4	12	..	19
Plymouth	11	5	6	..	1	5	2	2	1	....	....	....	....	....	7	4	..	11
Portsmouth	43	11	32	..	1	5	16	11	3	3	1	1	....	2	20	23	..	47
Rochester	12	4	8	..	1	2	2	2	2	....	3	....	....	....	7	5	..	12
Rumney	2	2	....	..	..	....	....	....	2	....	....	....	....	....	....	2	..	2
Rye	1	....	1	..	..	....	....	....	....	1	....	....	....	....	1	....	..	1
Salem	1	1	....	..	..	....	....	....	....	....	....	....	....	1	1	....	..	1
Seabrook	2	1	1	..	..	....	1	1	....	....	....	....	....	....	1	1	..	2
Somersworth	17	11	6	..	..	3	5	4	2	1	....	2	....	....	9	8	..	18
Stratford	8	1	7	..	..	1	2	1	4	....	....	....	....	....	3	5	..	8
Sunapee	2	1	1	..	..	2	....	....	....	....	....	....	....	....	....	2	..	2
Suncook	16	4	12	..	..	1	5	3	4	....	1	1	....	1	5	11	..	16
Swanzey	5	3	2	..	..	1	....	2	1	1	....	....	....	....	2	3	..	5
Tilton	5	2	3	..	..	....	1	2	1	....	1	....	....	....	3	2	..	5
Troy	4	1	3	..	..	....	....	1	....	1	1	....	1	....	3	1	..	4
Wakefield	1	1	....	..	..	....	....	1	....	....	....	....	....	....	....	1	..	1
Walpole	3	2	1	..	..	....	1	1	....	....	....	....	1	....	1	2	..	3
Warner	3	....	3	..	..	1	2	....	....	...	....	....	....	...	....	3	..	3
Warren	1	....	1	..	..	....	1	....	....	....	....	....	....	....	1	....	..	1
Weare	1	1	....	..	..	....	1	....	....	....	....	....	....	....	1	....	..	2
Whitefield	3	1	2	..	..	1	....	2	....	....	....	....	....	....	1	2	..	4
Wilton	2	....	2	..	..	....	....	1	....	....	1	....	....	....	1	1	..	2
Wolfeborough	3	3	....	..	..	....	2	1	....	....	....	....	....	....	1	2	..	3
Woodstock	1	....	1	..	..	....	....	....	1	....	....	....	....	....	....	1	..	1
Woodsville	9	1	8	..	1	....	4	1	2	1	....	....	....	....	3	6	..	10
Residence not stated	12	3	9	..	1	....	3	2	2	1	1	....	....	2	6	3	3	12
Total, 104 towns	1156	390	755	1	35	146	310	258	138	95	65	25	7	77	545	606	5	1242

*Sanatorium examinations.

SPUTUM EXAMINATIONS, 1906.

City or Town.	Number of cases examined.	Positive.	Negative.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Alton	1	....	1	....	....	....	1	....	....	....	....	....	1	....	....	1
Andover	6	....	6	1	....	2	....	3	....	....	....	....	5	1	....	6
Ashland	18	6	12	5	5	6	1	....	....	....	....	1	8	10	....	18
Barnstead	3	...	3	1	2	....	....	....	....	....	....	....	2	1	....	3
Bath	3	1	2	....	1	1	....	1	....	....	....	....	....	3	....	3
Bedford	1	1	....	....	1	....	....	....	....	....	....	....	....	1	....	1
Belmont	5	3	2	....	3	1	....	1	....	....	....	....	2	3	....	5
Bennington	1	....	1	...	....	...	....	1	....	....	....	....	....	1	....	1
Berlin	29	15	14	....	2	11	5	10	1	....	....	..	19	10	....	29
Bethlehem	15	6	9	1	1	7	5	....	....	....	....	1	9	6	....	15
Boscawen	19	4	15	....	4	3	2	4	2	....	2	2	6	13	....	19
Bristol	1	1	....	1	....	....	....	....	....	....	...	....	....	1	....	1
Campton	1	1	....	....	....	....	....	....	1	....	....	....	....	1	....	1
Canterbury	3	1	2	....	....	1	2	....	....	....	....	....	1	2	....	3
Charlestown	4	2	2	....	1	2	1	....	....	....	....	...	2	2	....	4
Claremont	12	1	11	2	3	2	2	....	3	....	....	....	4	8	....	12
Concord	145*	43	102	15	24	37	20	13	6	3	1	26	79	66	....	152
Contoocook	2	....	2	....	....	....	1	1	....	....	....	....	....	2	....	2
Conway	8	3	5	....	2	1	4	1	....	...	....	....	3	5	....	8
Derry	7	3	4	....	...	3	3	1	....	....	....	....	4	3	....	7
Dover	57	31	26	1	5	21	18	7	1	3	....	1	25	31	1	63
Durham	3	....	3	....	....	2	1	....	....	....	....	....	....	3	....	4
Enfield	4	2	2	....	1	1	....	1	....	....	1	....	3	1	....	4
Epping	3	....	3	...	....	....	1	2	....	...	....	....	1	2	....	3
Epsom	6	2	4	....	....	1	1	1	1	2	....	....	2	4	....	6
Exeter	12	3	9	....	....	5	3	3	1	....	....	....	5	7	....	15
Farmington	9	4	5	....	1	....	4	2	....	1	....	1	4	5	....	9
Fitzwilliam	1	1	....	...	....	....	....	....	1	....	....	....	1	....	....	1
Franconia	2	....	2	....	....	1	...	1	....	....	....	....	1	1	....	2
Franklin	42	9	33	6	6	9	13	2	1	1	2	2	18	24	...	47
Goffstown	2	1	1	....	....	2	....	....	....	....	....	....	1	1	....	2
Gorham	1	1	....	....	....	....	....	....	....	1	....	....	1	....	....	1
Grasmere	24	12	12	....	2	....	6	6	7	1	1	1	17	7	....	25
Greenfield	6	2	4	....	....	2	1	1	1	1	....	....	2	4	....	6

*Eleven of these from Pembroke Sanatorium.

SPUTUM EXAMINATIONS, 1906.—*Continued.*

City or Town.	Number of cases examined.	Positive.	Negative.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Greenland	1	....	1	....	....	....	...	....	....	....	...	....	....	1	....	1
Greenville	1	1	....	....	....	....	....	....	....	1	....	....	....	1	.. .	1
Hanover	35	4	31	....	2	15	2	3	4	4	....	5	14	21	...	37
Hampton	7	4	3	....	2	3	1	1	...	....	....	....	3	4	....	8
Haverhill	8	3	5	....	2	1	3	1	....	1	....	....	2	6	....	8
Henniker	1	....	1	....	....	....	....	....	....	....	....	....	....	1	....	1
Hill	2	1	1	....	....	1	....	....	....	....	1	....	1	1	....	2
Hillsborough	9	....	9	1	1	1	1	...	1	1	3	....	4	5	....	11
Hinsdale	2	1	1	. ..	....	1	1	...	....	....	....	....	2	...	....	3
Hudson	2	1	1	....	....	1	....	1	....	....	....	....	1	1	....	3
Kingston	1	1	....	....	....	....	...	1	....	....	....	....	1	....	....	1
Keene	64	14	50	1	8	19	10	8	12	5	1	....	20	44	....	67
Laconia	28	9	19	...	14	6	1	3	4	....	....	....	13	15	...	33
Lancaster	26	7	19	....	3	10	3	8	....	2	....	....	13	13	....	27
Lebanon	40	9	31	1	6	8	7	5	6	2	4	1	24	16	....	40
Lisbon	3	1	2	....	....	1	1	...	....	1	....	....	2	1	...	4
Littleton	18	2	16	....	1	6	3	4	1	2	1	....	10	8	1	25
Lincoln	5	1	4	....	...	3	1	1	....	....	....	....	3	2	....	5
Manchester	132	47	85	1	11	43	42	17	8	4	....	6	65	65	2	134
Milford	9	3	6	....	....	4	2	3	...	....	....	....	7	1	1	10
Meredith	3	1	2	....	....	2	1	....	...	....	....	....	1	2	....	3
Milan	1	....	1	....	....	1	....	....	....	....	...	....	1	....	....	1
Milton	1	....	1	....	....	1	....	....	....	....	....	....	....	1	....	1
Nashua	84	37	47	5	10	23	27	11	3	3	....	2	43	41	...	87
Newmarket	1	1	....	....	1	....	....	....	....	....	....	....	....	1	....	1
New London	2	1	1	....	....	1	....	1	....	....	....	....	2	....	....	2
Newport	8	3	5	....	....	....	3	4	1	....	....	....	2	6	....	9
Northwood	6	3	3	....	....	2	2	2	....	....	....	....	3	3	....	6
Ossipee	2	1	1	....	....	2	....	....	....	....	....	....	...	2	....	2
Peterborough	3	....	3	....	....	2	1	....	....	....	....	....	2	1	....	3
Pittsfield	12	2	10	3	1	....	2	2	3	....	1	....	3	9	....	16
Plymouth	11	1	10	1	4	3	2	1	....	....	....	....	4	7	....	11
Portsmouth	49	17	32	1	7	16	11	5	4	1	2	2	28	21	....	56
Rochester	16	4	12	....	1	7	1	2	2	3	....	....	8	8	....	13

SPUTUM EXAMINATIONS, 1906.—*Concluded.*

City or Town.	Number of cases examined.	Positive.	Negative.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Rumney	1	....	1	....	....	....	....	....	....	....	....	1	1	....	....	1
Salem	1	....	1	...	1	....	....	....	....	....	...	....	....	1	....	1
Sandwich	1	....	1	....	1	...	....	....	....	....	....	....	....	1	....	1
Seabrook	3	....	3	1	2	....	....	....	....	....	....	....	2	1	....	3
Somersworth	18	6	12	1	1	3	9	2	1	1	....	....	9	9	....	19
Springfield	1	....	1	....	1	....	....	...	....	...	..	....	....	1	....	1
Stratford	5	....	5	....	1	1	1	1	1	....	....	....	2	3	....	5
Sunapee	1	....	1	....	....	....	....	1	....	....	....	....	1	....	....	1
Suncook	22	3	19	4	7	1	3	4	2	....	1	....	10	12	....	24
Sutton	2	....	2	....	....	....	1	....	....	1	....	....	1	1	...	2
Swanzey	4	....	4	1	....	1	1	1	....	....	....	....	2	2	....	4
Tamworth	1	1	....	....	....	....	1	....	....	....	....	....	....	1	....	1
Tilton	7	....	7	....	1	2	1	1	1	1	...	....	4	3	....	7
Troy	6	1	5	....	....	3	1	....	1	1	....	....	5	1	...	7
Walpole	7	1	6	....	1	1	1	1	1	1	1	...	5	2	....	8
Warner	3	1	2	....	1	1	1	....	....	....	....	....	2	1	....	3
Warren	2	2	....	....	1	....	....	....	....	1	....	....	1	1	....	1
Wentworth	1	1	....	....	1	....	....	....	....	....	....	....	....	1	....	1
Whitefield	3	....	3	....	1	...	....	....	2	....	....	....	1	2	....	3
Wilton	1	....	1	....	1	....	....	....	....	....	....	....	....	1	....	1
Winchester	1	1	....	....	..	...	....	1	....	....	....	....	1	....	....	1
Wolfeborough	7	1	6	2	1	2	....	1	1	....	....	....	4	3	....	9
Total	1157	367	790	56	162	319	253	159	85	49	22	52	575	577	5	1231

EXAMINATIONS IN CASES OF SUSPECTED DIPHTHERIA.

During the two years ending October 1, 1906, 1,937 swab and culture examinations were made at the laboratory for diagnostic purposes in cases of suspected diphtheria. These examinations represent 1,440 individual cases. The following tables give the towns from which the specimens were sent, with the results of the examinations:

EXAMINATIONS FOR DIPHTHERIA, 1905.

City or Town.	Number of individual cases.	Number of specimens sent.	First negative.	Second negative.	Third negative.	First positive.	Second positive.	Third positive.	Subsequent examinations.	First negative and second positive.
Andover	3	4	3	1						
Antrim	1	1	1							
Ashland	2	2	1			1				
Barnstead	1	1				1				
Barrington	14	20	13	4	1	1			1	
Bartlett	2	2	1			1				
Bedford	2	3	1	1		1				
Belmont	7	8	7	1						
Bennington	1	1	1							
Berlin	2	2	1			1				
Bethlehem	3	3	2			1				
Boscawen	2	2	2							
Bow	2	2	2							
Bradford	1	1	1							
Brentwood	2	2	2							
Bristol	1	3			1	1	1			
Canaan	8	9	6	1		2				
Center Harbor	1	1	1							
Claremont	9	9	6			3				
Colebrook	1	1	1							
Concord	192	334	173	28	16	19	12	7	79	2
Conway	11	11	7			4				
Cornish	1	3	1	1	1					
Derry	2	4	2	2						
Dover	1	1	1							
Dublin	1	1	1							
Eaton	3	3	2			1				
Enfield	16	20	7	2	1	9	1			
Epsom	7	12	6			1	1	1	3	
Exeter	3	3	3							
Farmington	1	1	1							
Fitzwilliam	2	2	1			1				
Franklin	41	65	27	4	5	14	8	3	4	
Goffstown	5	12	3	2	3	2	1	1		

EXAMINATIONS FOR DIPHTHERIA, 1905.—*Continued.*

City or Town.	Number of individual cases.	Number of specimens sent.	First negative.	Second negative.	Third negative.	First positive.	Second positive.	Third positive.	Subsequent examinations.	First negative and second positive.
Greenfield	3	4	1	.....	.....	2	1	.....	.....	1
Greenland	1	1	1	.....	.....	.....	.....	.....	.....	.....
Hanover	56	61	51	5	.....	5	.....	.....	.....	.....
Haverhill	6	6	6	.....	.....	.....	.....	.....	.....	.....
Hebron	2	2	2	.....	.....	.....	.....	.....	.....	.....
Henniker	4	4	4	.....	.....	.....	.....	.....	.....	.....
Hill	1	1	1	.....	.....	.....	.....	.....	.....	.....
Hillsborough	5	7	4	.....	.....	1	1	1	.....	.....
Holderness	1	2	1	1	.....	.....	.....	.....	.....	.....
Hooksett	2	2	.....	.....	.....	2	.....	.....	.....	.....
Hopkinton	1	2	1	1	.....	.....	.....	.....	.....	.....
Hudson	17	62	10	3	2	7	4	3	33	1
Keene	22	34	18	21	4	4	3	.....	1	.....
Laconia	6	6	5	.....	.....	1	.....	.....	.....	.....
Lancaster	4	4	3	.....	.....	1	.....	.....	.....	.....
Lebanon	18	20	18	2	.....	.....	.....	.....	.....	.....
Lisbon	3	6	2	.....	1	1	1	.....	1	.....
Littleton	9	9	4	.....	.....	5	.....	.....	.....	.....
Loudon	5	5	5	.....	.....	.....	.....	.....	.....	.....
Lyme	4	4	4	.....	.....	.....	.....	.....	.....	.....
Manchester	100	117	74	9	1	26	6	1	.....	.....
Marlow	2	2	2	.....	.....	.....	.....	.....	.....	.....
Milford	6	8	4	.....	1	2	1	.....	.....	.....
Monroe	1	1	1	.....	.....	.....	.....	.....	.....	.....
Nashua	47	62	34	4	3	13	4	1	3	.....
Newcastle	1	1	1	.....	.....	.....	.....	.....	.....	.....
Newfields	1	1	.....	.....	.....	1	.....	.....	.....	.....
Newmarket	4	5	1	1	.....	3	.....	.....	.....	.....
Northfield	1	1	1	.....	.....	.....	.....	.....	.....	.....
Orford	2	2	2	.....	.....	.....	.....	.....	.....	.....
Plainfield	2	2	2	.....	.....	.....	.....	.....	.....	.....
Plaistow	1	1	1	.....	.....	.....	.....	.....	.....	.....
Plymouth	5	8	4	1	1	1	1	.....	.....	1
Portsmouth	12	17	12	2	2	.....	1	.....	.....	1

EXAMINATIONS FOR DIPHTHERIA, 1905.—*Concluded.*

City or Town.	Number of individual cases.	Number of specimens sent.	First negative.	Second negative.	Third negative.	First positive.	Second positive.	Third positive.	Subsequent examinations.	First negative and second positive.
Rochester	13	17	9	3	.....	4	1	.....	.....	1
Sanbornton	1	1	1	.....	.....	.....	.....	.....	.....	.....
Springfield	1	2	1	1	.....	.....	.....	.....	.....	.....
Stewartstown	6	7	4	1	.....	2	.....	.....	.....	.....
Strafford	2	6	2	2	1	.....	.....	.....	1	.....
Stratford	3	7	1	1	1	2	1	.....	1	.....
Suncook	2	2	1	.....	.....	1	.....	.....	.....	.....
Tilton	3	3	3	.....	.....	.....	.....	.....	.....	.....
Wakefield	2	2	2	.....	.....	.....	.....	.....	.....	.....
Warner	1	1	1	.....	.....	.....	.....	.....	.....	.....
Warren	2	2	2	.....	.....	.....	.....	.....	.....	.....
Whitefield	2	3	2	1	.....	.....	.....	.....	.....	.....
Wilton	5	5	5	.....	.....	.....	.....	.....	.....	.....
Winchester	2	2	2	.....	.....	.....	.....	.....	.....	.....
Windham	2	4	1	1	1	1	.....	.....	.....	.....
Wolfeborough	2	2	2	.....	.....	.....	.....	.....	.....	.....
Woodsville	12	23	8	3	3	4	2	1	2	.....
Total, 85 towns	767	1108	614	93	49	153	51	19	129	7

EXAMINATIONS FOR DIPHTHERIA, 1906.

City or Town.	Number of individual cases.	Number of specimens sent.	First negative.	Second negative.	Third negative.	First positive.	Second positive.	Third positive.	Subsequent examinations.	First negative and second positive.
Alton	1	1	.....	.....	.....	1	.....	.....	.....	.....
Antrim	1	1	1	.....	.....	.....	.....	.....	.....	.....
Auburn	1	1	1	.....	.....	.....	.....	.....	.....	.....
Ashland	6	6	5	.....	.....	1	.....	.....	.....	.....
Barnstead	1	1	1	.....	.....	.....	.....	.....	.....	.....
Barrington	2	2	2	.....	.....	.....	.....	.....	.....	.....
Bath	4	7	3	2	1	1	.....	.....	.....	.....
Belmont	1	1	1	.....	.....	.....	.....	.....	.....	.....
Berlin	10	11	7	.....	.....	3	1	.....	.....	.....

EXAMINATIONS FOR DIPHTHERIA.—*Continued.*

City or Town.	Number of individual cases.	Number of specimens sent.	First negative.	Second negative.	Third negative.	First positive.	Second positive.	Third positive.	Subsequent examinations.	First negative and second positive.
Boscawen	11	17	7	2	2	4	1	.....	1	.....
Bristol	7	9	5	1	.....	2	.....	.....	1	.....
Canaan	2	2	.....	.....	.....	2	.....	.....	.....	.....
Candia	2	2	2	.....	.....	.....	.....	.....	.....	.....
Canterbury	1	1	1	.....	.....	.....	.....	.....	.....	.....
Centre Harbor	1	1	1	.....	.....	.....	.....	.....	.....	.....
Chester	8	8	7	.....	.....	1	.....	.....	.....	.....
Claremont	14	15	10	1	.....	4	.....	.....	.....	.....
Concord	126	142	123	14	.....	3	1	.....	.....	1
Conway	2	2	2	.....	.....	.....	.....	.....	.....	.....
Derry	1	1	1	.....	.....	.....	.....	.....	.....	.....
Dorchester	1	1	1	.....	.....	.....	.....	.....	.....	.....
Dover	8	8	7	.....	.....	1	.....	.....	.....	.....
Epping	5	6	4	1	.....	1	.....	.....	.....	.....
Exeter	7	13	5	2	2	2	.....	.....	.....	2
Enfield	13	17	8	3	1	5	.....	.....	.....	.....
Farmington	2	2	2	.....	.....	.....	.....	.....	.....	.....
Franconia	1	1	1	.....	.....	.....	.....	.....	.....	.....
Franklin	34	40	29	2	2	5	2	.....	.....	.....
Goffstown	3	4	2	1	.....	1	.....	.....	.....	.....
Grasmere	16	28	5	10	1	11	1	.....	.....	.....
Greenfield	2	3	2	1	.....	.....	.....	.....	.....	.....
Greenland	1	1	1	.....	.....	.....	.....	.....	.....	.....
Groveton	1	1	1	.....	.....	.....	.....	.....	.....	.....
Hanover	31	39	30	8	.....	1	.....	.....	.....	.....
Henniker	3	3	3	.....	.....	.....	.....	.....	.....	.....
Hillsborough	5	5	5	.....	.....	.....	.....	.....	.....	.....
Hooksett	1	1	1	.....	.....	.....	.....	.....	.....	.....
Hudson	2	2	2	.....	.....	.....	.....	.....	.....	.....
Keene	44	67	30	12	6	14	3	1	1	.....
Laconia	7	7	4	.....	.....	3	.....	.....	.....	.....
Lancaster	3	3	3	.....	.....	.....	.....	.....	.....	.....
Lakeport	1	2	.....	1	.....	1	.....	.....	.....	.....
Lebanon	18	21	13	3	.....	5	.....	.....	.....	.....

EXAMINATIONS FOR DIPHTHERIA, 1906.—*Concluded.*

City or Town.	Number of individual cases.	Number of specimens sent.	First negative.	Second negative.	Third negative.	First positive.	Second positive.	Third positive.	Subsequent examinations.	First negative and second positive.
Lisbon	5	5	5	....	.....	.....	.....	.....	.....	.....
Littleton	10	11	8	1	.....	2	.....	.....	.....	.....
Lyme	3	3	3	.....	.....	.....	.....	.....	.....	.....
Manchester	92	106	63	8	3	29	3	.....	.....	.....
Marlow	2	2	.....	.....	.....	2	.....	.....	.....	.....
Milford	5	5	4	.....	.....	1	.....	.....	.....	.....
Nashua	33	42	26	5	3	7	.....	.....	1	.....
New London	2	4	1	1	.....	1	1	.....	.....	.....
Newmarket	3	3	3	.....	.....	....	.....	.....	.....	.....
Northwood Road	2	2	2	.....	.....	.....	.....	.....	.....	.....
Ossipee	1	1	1	.....	.....	.....	.....	.....	.....	.....
Pembroke	1	1	1	.....	....	.....	.....	.....	.....	.....
Pittsfield	2	3	2	1	.....	.....	.....	.....	.....	.....
Plaistow	4	5	3	1	.....	1	.....	.....	.....	.....
Plymouth	4	5	3	1	.....	1	.....	.....	.....	.....
Portsmouth	12	12	10	.....	.....	2	.....	.....	.....	.....
Rochester	11	16	9	2	1	2	1	.....	.....	1
Sandown	1	1	1	.....	.....	.....	.....	.....	.....	.....
Strafford	3	4	2	1	.....	1	.....	.....	.....	.....
Suncook	2	3	1	1	.....	1	.....	.....	.....	.....
Swanzey	1	1	1	.....	.....	.....	.....	.....	.....	.....
Tilton	6	7	4	1	.....	2	.....	.....	.....	.....
Walpole	19	19	14	.....	.....	5	.....	.....	.....	.....
Warner	1	1	1	.....	.....	.....	.....	.....	.....	.....
Wilton	5	8	2	2	.....	3	1	.....	.....	.....
Whitefield	2	2	1	.....	.....	1	.....	.....	.....	.....
Wolfeborough	1	1	1	.....	.....	.....	.....	.....	.....	.....
Woodsville	29	50	18	8	8	11	4	.....	.....	1
Total	673	829	529	97	30	144	19	1	4	5

EXAMINATIONS IN CASES OF SUSPECTED TYPHOID FEVER.

During the period October 1, 1904, to October 1, 1906, 522 specimens of blood, representing 492 cases, were subjected to the Widal, or serum, test, for typhoid fever. In 156 cases a positive result was obtained. The following tables give the facts in detail; to wit, the towns from which the specimens were received, number of cases, results of examinations, and age and sex of patients:

TYPHOID EXAMINATIONS, 1905.

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Antrim	1	1	....	..	..	....	....	1	....	....	....	....	....	....	1	....	..	1
Ashland	1	....	1	..	..	....	....	....	....	....	....	....	....	1	1	....	..	1
Barrington	3	1	2	..	..	1	....	...	1	....	...	....	....	1	....	3	..	3
Bartlett	1	....	1	..	..	1	...	....	....	....	....	....	....	....	1	....	..	1
Berlin	2	....	2	..	..	....	....	1	1	....	....	....	....	....	2	....	..	2
Center Harbor	1	....	1	..	..	....	...	....	1	....	....	....	....	....	1	....	..	1
Charlestown	2	1	1	..	1	....	1	....	....	...	....	....	....	....	1	1	..	2
Claremont	8	1	7	..	..	3	1	1	2	1	....	....	....	....	4	4	..	8
Concord	31	5	26	..	8	3	9	6	2	2	....	1	....	....	16	15	..	40
Conway	2	..	2	..	..	....	1	1	....	....	....	....	....	....	2	....	..	3
Derry	1	....	1	..	..	....	....	1	....	....	....	....	....	....	1	....	..	1
Enfield	3	....	3	..	1	....	2	....	....	....	....	....	....	....	2	1	..	4
Exeter	21	5	16	..	10	3	3	2	1	2	....	....	....	..	15	6	..	22
Franklin	41	19	21	1	1	13	13	7	4	2	....	....	....	1	25	16	..	43
Hampton	7	4	3	..	1	....	2	....	2	1	....	....	....	1	6	1	..	7
Hanover	11	5	6	..	1	5	2	2	1	....	....	....	....	....	7	4	..	15
Henniker	2	....	2	..	..	....	1	....	1	....	....	....	....	..	2	....	..	2
Hillsborough	1	1	....	..	..	1	....	....	....	...	....	....	....	....	....	1	..	1
Hudson	3	....	3	..	..	....	2	....	1	....	....	....	....	....	3	....	..	4
Keene	12	3	9	..	..	3	2	3	2	1	...	1	....	....	8	4	..	13
Laconia	3	1	2	..	..	....	1	2	....	...	....	....	....	....	1	2	..	3
Lebanon	9	2	7	..	1	2	5	1	....	...	....	...	....	....	4	5	..	9
Lisbon	1	....	1	..	1	....	....	....	....	....	....	....	....	....	1	....	..	1

TYPHOID EXAMINATIONS. 1905.—*Concluded.*

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Littleton	2	....	2	..	..	1	1	....	....	....	....	....	....	....	....	2	..	2
Lyme	1	...	1	..	..	....	....	1	....	....	....	...	....	....	1	....	..	1
Manchester	7	....	7	..	2	1	3	....	....	....	....	....	...	1	4	3	..	7
Milford	1	....	1	..	..	....	1	....	....	....	....	....	....	....	1	....	..	1
Nashua	6	....	6	..	1	2	1	2	....	....	....	....	....	....	5	1	..	7
Northwood	1	1	....	..	..	....	....	....	....	....	....	....	....	1	1	....	..	1
Orford	1	1	....	..	..	...	....	....	....	1	....	....	....	....	1	....	..	1
Peterborough	2	....	2	..	..	1	1	....	...	....	....	....	....	....	....	2	..	2
Plainfield	1	....	1	..	..	....	...	....	....	....	....	....	....	....	....	1	..	1
Portsmouth	5	2	3	..	..	1	2	1	....	....	....	....	....	2	3	2	..	5
Somersworth	1	....	1	..	..	....	....	....	....	1	....	....	....	...	....	1	..	1
Strafford	1	....	1	..	..	....	....	....	1	....	....	....	....	....	....	1	..	1
Stratford	2	1	1	..	..	1	1	....	....	....	1	....	....	....	2	....	..	2
Warner	1	....	1	..	..	1	1	....	....	....	....	....	....	....	....	1	..	1
Webster	1	...	1	..	..	....	....	....	....	....	....	....	....	....	1	....	..	1
Winchester	1	....	1	..	..	....	1	....	....	....	....	....	....	....	1	....	..	1
Total, 39 towns	201	54	146	1	28	42	57	32	20	11	1	2	....	8	124	77	..	222

TYPHOID EXAMINATIONS, 1906.

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Alstead	1	....	1	..	..	1	....	....	....	....	....	....	....	....	1	....	..	1
Andover	1	....	1	..	..	1	....	....	....	....	....	....	....	....	1	....	..	1
Antrim	1	....	1	..	..	....	1	....	....	....	...	....	....	....	1	....	..	1
Ashland	1	1	....	..	..	1	....	....	....	....	....	....	....	....	....	1	..	1
Barrington	....	....	1	..	..	....	1	....	....	....	....	....	....	....	1	....	..	1
Bath	1	....	1	..	..	1	....	....	....	....	....	....	...	....	1	....	..	1
Belmont	1	....	1	..	1	....	....	....	....	....	....	....	....	....	....	1	..	1
Berlin	1	....	1	..	..	....	....	....	....	....	...	....	....	1	....	....	..	....
Bristol	4	2	2	..	..	4	....	....	....	....	....	....	....	....	3	....	1	4

TYPHOID EXAMINATIONS, 1906.—*Continued.*

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Canaan	1	....	1	..	..	....	1	....	....	....	....	....	....	....	1	....	..	1
Charlestown	1	....	1	..	1	....	....	...	....	....	...	....	....	....	1	....	..	1
Claremont	13	3	10	..	2	8	2	....	....	....	....	....	....	....	1	7	6	13
Concord	83	28	55	..	7	25	23	10	4	3	4	....	....	7	48	28	7	83
Conway	3	2	1	..	..	1	....	....	1	....	....	....	....	1	3	....	..	3
Derry	5	1	4	..	1	1	....	3	....	....	....	....	....	....	3	2	..	5
Dover	3	....	3	..	1	....	....	....	1	1	..	....	....	....	1	2	..	3
Durham	1	....	1	..	..	....	....	1	....	....	....	....	....	....	1	....	..	1
Enfield	9	7	2	..	1	1	3	3	....	....	....	....	....	1	7	1	1	9
Exeter	15	4	11	..	..	2	3	7	1	1	....	....	....	1	10	4	1	15
Farmington	1	....	1	..	..	....	1	....	....	....	....	....	....	....	....	....	1	1
Franconia	1	....	1	..	..	....	....	1	....	....	....	....	....	....	1	....	..	1
Franklin	22	6	16	..	2	7	5	3	2	2	....	....	....	1	13	9	..	22
Gilmanton	1	....	1	..	..	....	....	1	....	....	....	....	....	....	....	1	..	1
Goffstown	1	1	....	..	..	....	1	....	....	..	....	....	....	....	....	1	..	1
Hampton	4	2	1	1	1	....	2	....	....	....	1	....	....	....	3	1	..	4
Hillsborough	3	2	1	..	..	1	2	....	....	....	....	...	....	....	2	1	..	3
Hopkinton	1	....	1	..	..	1	....	....	....	....	....	....	....	....	....	1	..	1
Hanover	15	6	9	..	..	5	2	3	2	....	1	....	....	2	6	9	..	17
Keene	12	4	8	..	1	1	5	3	1	....	1	...	....	....	9	3	..	14
Laconia	5	2	3	..	..	....	3	1	1	....	....	....	....	....	4	1	..	5
Lebanon	8	4	4	..	..	2	1	3	1	1	....	....	....	....	6	2	..	8
Lisbon	2	2	....	..	..	1	1	...	....	....	....	....	....	....	....	2	..	2
Littleton	11	7	4	..	1	7	3	....	....	....	....	....	....	....	5	6	..	11
Manchester	23	5	18	..	4	8	7	....	1	....	...	....	....	3	12	11	..	25
Milton	1	....	1	..	..	....	....	....	....	....	1	....	....	....	1	....	..	1
Nashua	5	1	4	..	..	4	....	....	....	....	....	....	1	....	2	2	1	5
New London	1	....	1	..	..	1	....	....	....	....	....	....	....	....	1	....	..	1
Newport	1	...	1	..	1	....	....	....	....	....	....	....	....	....	....	1	..	1
Orford	1	1	....	..	1	....	....	....	....	....	....	....	....	....	1	....	..	1
Penacook	1	1	....	..	1	....	....	....	....	....	....	....	....	....	....	1	..	1
Pittsfield	1	1	....	..	1	....	....	....	....	....	....	....	....	....	....	1	..	1
Portsmouth	7	1	6	..	1	1	1	2	2	....	....	....	....	....	2	5	..	7
Plymouth	3	2	1	..	..	....	....	....	2	....	....	....	....	1	2	....	1	3

TYPHOID EXAMINATIONS, 1906.—*Concluded.*

City or Town.	Number of cases examined.	Positive.	Negative.	Doubtful.	1 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	Male.	Female.	Not stated.	Number of examinations.
Rochester	2	....	2	..	..	....	1	....	....	1	....	....	....	....	2	...	..	2
Stewartstown	2	2	....	..	1	1	....	...	....	....	...	....	....	....	2	....	..	2
Somersworth	1	1	....	..	..	1	....	....	....	....	....	....	....	....	1	....	..	1
Suncook	4	....	4	..	..	....	3	....	....	....	...	....	....	1	1	2	1	6
Troy	1	1	....	..	..	....	....	....	1	....	....	...	....	....	1	....	..	1
Walpole	1	....	1	..	..	1	....	....	....	....	....	....	....	....	1	....	..	1
Warner	2	2	....	..	..	1	1	....	....	....	...	...	....	....	2	....	..	2
Wilton	1	....	1	..	..	....	. .	1	....	....	....	....	....	....	....	1	..	1
Wolfeborough	1	....	1	..	..	....	1	....	....	....	....	...	....	....	....	1	..	1
Total	291	102	188	1	29	89	74	42	20	9	8	....	1	19	163	108	20	300

MISCELLANEOUS EXAMINATIONS.

For gonococci 138; positive 59, negative 79.
For malaria 10, all negative.
Pus for streptococci 4; positive 3, negative 1.
Faeces for tuberculosis 4; positive 2, negative 2.
Tissue for tuberculosis 6; positive 4, negative 2.
Pus for actinomycosis 1; negative.

PURE FOOD LAWS OF NEW HAMPSHIRE.

ADULTERATIONS AND SALE OF FOODS—DRUGS AND POISONS—ADULTERATION OF CANDY—SALE OF MAPLE SUGAR AND CIDER VINEGAR—FOOD STANDARDS AND DEFINITIONS—THE EXAMINATION OF LIQUORS.

ADULTERATIONS, AND THE SALE OF UNWHOLESOME FOODS AND POISONS.

(Chapter 269 of the Public Statutes.)

SECTION 1. No person shall sell, or offer for sale, any adulterated drug or substance to be used in the manner of medicine, or any adulterated article of food or substance to be used in the manner of food or drink.

SECT. 2. *If any drug or substance used for medicine, sold under a name recognized by the United States Pharmacopœia, or in some other pharmacopœia, or other standard work of materia medica, differs materially from the standard of strength, quality, or purity laid down in such work, or contains less of the active principle than is contained in the genuine article, weight for weight, or falls below the professed standard under which it is sold, it shall be deemed to be adulterated within the meaning of this chapter.*

SECT. 3. *If any food or substance to be eaten or used in the manner of food or drink* **contains a less quantity of any valuable constituent than is contained in the genuine article, weight for weight, or contains any substance foreign to the well known article under whose name it is sold,** *or is colored, coated, polished, or powdered, whereby damage is concealed, or contains any added poisonous ingredient, or consists wholly or partly of any decomposed, putrid or diseased substance, or has become offensive or injured from age or improper care, it shall be deemed to be adulterated within the meaning of this chapter.*

SECT. 4. **Whoever fraudulently adulterates for the purpose of sale any article of food or drink, drug or medicine, or knowingly sells any fraudulently adulterated article of food or drink, drug or medicine, or any kind of diseased or unwholesome provisions as defined in this chapter, shall be imprisoned not exceeding one year, or be fined not exceeding four hundred dollars.**

SECT. 5. Every person offering or exposing for sale any drug or article of food within the meaning of this chapter shall furnish to any analyst, or other officer duly appointed for the purpose, who shall apply to him for the same and tender him its value in money, a sample sufficient for the purpose of the analysis of such drug or article of food.

SECT. 6. Any person who has reason to doubt the purity or genuineness of any article of food which he has purchased, may send at his own expense a sealed sample of it to the State Board of Health for inspection. If upon examination the article appears to be adulterated, the board may obtain a certified sample of it, and should this sample prove to be adulterated, the board shall begin proceedings at once against the vendor.

SECT. 7. Whoever hinders, obstructs, or in any way interferes with any inspector, analyst, or other officer appointed hereunder, in the performance of his duty, shall be fined not exceeding fifty dollars for the first offense and one hundred dollars for each subsequent offense.

SECT. 8. Before commencing the analysis of a sample, the analyst shall reserve a portion, which shall be sealed; and in case of a complaint or indictment, part of the reserved portion of the sample alleged to be adulterated shall, upon application, be delivered to the defendant or his attorney, and part to the secretary of the State Board of Health.

SECT. 9. The State Board of Health shall adopt such measures as it may deem necessary to facilitate the enforcement of this chapter, and for the collecting and examining of drugs and foods, articles of clothing, fabrics, wall-paper, or anything containing poisonous pigments or substances whereby the health of any person may be injured.

SECT. 10. Whoever adulterates, for the purpose of sale, any liquor used or intended for drink, with cocculus indicus, vitriol, grains of paradise, opium, alum, capsicum, copperas, laurel-water, logwood, Brazil wood, cochineal, sugar of lead, or any other substance which is poisonous or injurious to health, or knowingly sells any such liquor so adulterated, shall be fined not exceeding one thousand dollars, or be imprisoned not exceeding one year.

SECT. 11. Whoever kills, or causes to be killed, for the purpose of sale, a calf less than four weeks old, or knowingly sells, or has in possession with intent to sell, for food, the meat of any such calf, shall be fined not exceeding fifty dollars, or be imprisoned not exceeding thirty days, or both.

SECT. 12. Any meat, unwholesome provisions or articles, sold, kept, or offered for sale, and any articles adulterated, in violation of any of the preceding sections, shall be forfeited.

SECT. 13. Every apothecary, druggist, or other person who sells any arsenic, corrosive sublimate, nux vomica, strychnine, or prussic acid, shall make a record of such sale in a book kept for that purpose, specifying the kind and quantity of the article sold, and the time when, and the name of the person to whom such sale is made, which record shall be open to all persons who may wish to examine the same.

SECT. 14. Any person who shall violate the provisions of the preceding section shall be fined not exceeding one hundred dollars.

SECT. 15. The two preceding sections shall not apply to physicians, in their prescriptions or their recipes to their patients.

SECT. 16. Any corporation, person, firm, or agent who shall sell or offer for sale or exchange any woven fabric or paper containing arsenic in any form, or any article of dress or of household use composed wholly or in part of such woven fabric or paper, or any article of dress containing arsenic, shall, upon conviction thereof, be fined not exceeding one hundred dollars; *provided, however*, that this section shall not apply to dress goods or articles of dress containing not more than one one-hundredth grain nor to other material containing not more than one-tenth grain of arsenic per square yard of the material. (Ch. 27, Laws of 1901.)

ADULTERATION OF CANDY PROHIBITED.

(Chapter 26, Laws of 1899.)

SECTION 1. No person shall by himself, his servant, or agent, or as the servant or agent of any other person or corporation, manufacture for sale, or knowingly sell or offer to sell, any candy adulterated by the admixture of terra alba, barytes, talc, or any other mineral substance, by poisonous colors or flavors, or other ingredients deleterious or detrimental to health.

SECT. 2. Whoever violates any of the provisions of this act shall be punished by a fine not exceeding one hundred dollars ($100) nor less than fifty dollars ($50). The candy so adulterated shall be forfeited and destroyed under direction of the court.

SECT. 3. It is hereby made the duty of the prosecuting attorneys of this state to appear for the people and to attend to the prosecution of all complaints under this act in all the courts in their respective counties.

FRAUDULENT SALE OF MAPLE SUGAR AND CIDER VINEGAR.

(Chapter 118, Laws of 1905.)

SECTION 1. No person shall sell, expose for sale, exchange, barter or deal in any article as and for maple sugar, maple candy or maple syrup unless the same shall be sugar, candy or syrup made solely from the sap of the maple tree.

SECT. 2. No person shall sell or expose for sale, exchange, barter or deal in any article as and for cider vinegar unless the same shall be vinegar made solely from cider made of apples and shall have an acidity equal to the presence of not less than four per cent. by weight, of absolute acetic acid, and shall contain not less than one and six tenths, by weight, of apple solids.

SECT. 3. No person shall have in his possession for sale, exchange or barter any article which is not maple sugar, maple candy or maple syrup, or which is not cider vinegar, as those articles are defined in the two preceding sections, which is labeled, marked or represented to be maple sugar, maple candy, maple syrup, or cider vinegar.

SECT. 4. Any person who shall violate any provision of the three preceding sections shall be fined not less than ten dollars nor more than fifty dollars.

FOOD STANDARDS AND DEFINITIONS.

RULINGS BY THE STATE BOARD OF HEALTH.

The laws relating to food products are so varied and the standards of composition so dissimilar among different states that for the guidance of manufacturers, jobbers and retailers the State Board of Health has made rulings which define and fix standards for all ordinary food stuffs.

These rulings furnish a definite basis for work in the enforcement of the "Pure Food Law," and are intended to anticipate any questions as to the attitude of the State Board of Health in regard to the application of the law to particular articles of food, and will be recognized as such at the State Laboratory of Hygiene. The definitions and standards here given are those advised by the United States Department of Agriculture, given in the United States Pharmacopœia, or after thorough investigation and trial adopted by many of the states.

Authority for such rulings is given the board by section 9, chapter 269

of the Public Statutes, which reads as follows: "The State Board of Health shall adopt such measures as it may deem necessary to facilitate the enforcement of this chapter, and for the collection and examination of drugs and foods," etc.

DEFINITIONS AND REQUIREMENTS.

I. The term "food" as herein used shall include confectionery, condiments and all articles used for food or drink by man.

II. Any article of food shall be deemed to be adulterated within the meaning of section 3, chapter 269 of the Public Statutes:

1. If any substance or substances have been mixed with it so as to lower or depreciate or injuriously affect its quality, strength or purity;

2. If any inferior or cheaper substance or substances have been substituted, wholly or in part for it;

3. If any valuable or necessary constituent or ingredient has been, wholly or in part, abstracted from it;

4. If it consists, wholly or in part, of any decomposed, putrid or diseased substance, or has become offensive or injured from age or improper care;

5. If it is colored, coated, polished or powdered, whereby damage is concealed, or if by any means it is made to appear better or of greater value than it really is;

6. If it contains any added poisonous or injurious ingredients, or any foreign substance.

ANTISEPTICS (Preservatives):

Salicylic acid, benzoic acid, boric acid, hydrofluoric acid, sulphurous acid and compounds of these acids; formaldehyde or formalin, and various mixtures known to the trade as "Freezine," "Iceine," "Formol," "Preservalines" of various kinds, etc., are antiseptics, and foods or food products containing them are adulterated.

A label stating that the article contains a certain preservative or an added color does not legalize it in this state.

The use of salt, sugar, vinegar, spices, saltpeter and wood smoke, as employed in curing meat, is not prohibited.

ADDED COLORING MATTER:

The addition of coal tar dyes or other coloring matter to any article of food is prohibited and constitutes an adulteration.

BAKING POWDERS:

No standard of composition is fixed for baking powders, but they must contain nothing injurious to health and should evolve not less than ten per cent. of their own weight of carbon dioxide when brought in contact with water:

BUTTER:

Standard butter is butter containing not less than eighty-two and one half (82.5) per cent. of butter fat. The use of vegetable coloring matter is allowable.

BUTTER—RENOVATED OR PROCESS:

Standard renovated or process butter must contain not more than sixteen (16) per cent. of water, and at least eighty-two and one half (82.5) per cent. of butter fat. Renovated or process butter must be so marked and must not be substituted for butter unless so requested by the purchaser.

CANDY:

The use of poisonous colors or flavors or other injurious ingredients, the admixture of terra alba, barytes, talc or other mineral substance to give weight and volume to the mass, is an adulteration.

CANNED GOODS:

Canned goods must bear the name and address of the packer. If dried before packing they must be labeled "SOAKED OR BLEACHED GOODS" in letters not less than two line pica in size. The sale of peas or other vegetables greened with copper or otherwise artificially colored is prohibited.

CATSUPS:

Catsups are preparations of tomato pulp and spices and must contain no added coloring material or preservatives.

CHEESE:

Standard whole milk cheese, full cream cheese, or cream cheese is cheese containing, in the water free substance, not less than forty-eight (48) per cent. of butter fat. The use of harmless vegetable coloring matter is allowable. The use of preservatives other than salt is prohibited.

CIDER:

Cider is unfermented juice of the apple. Any substitute for apple juice, or any added antiseptic constitutes an adulteration.

COFFEE:

Coffee must be true to name. It must not be coated or polished to conceal inferiority.

COFFEE COMPOUNDS:

Mixtures of cereals or other articles sold as substitutes for coffee must be sold as a mixture or compound under an original or coined name, and not under the name of any ingredient thereof.

CREAM:

Standard cream is cream containing not less than eighteen (18) per cent. of milk fat. Cream shall be produced wholly from pure milk and be free from added coloring matter, preservatives, or other additions of any kind.

FLAVORING EXTRACTS:

Bottles and packages containing flavoring extracts must bear the name and address of the manufacturer.

Lemon extract shall contain at least five per cent. of the pure oil of lemon dissolved in alcohol.

Vanilla extract must be made wholly from vanilla bean, and shall contain no artificial coloring. It must contain at least .050 per cent. of vanillin. When other flavoring extracts are used, such as artificial vanillin, tonka bean, etc., the package and bottle shall be so labeled as to show its true character. Such a term as "Artificial Vanilla Flavor" may be used, but such a term as "Compound Extract of Vanilla" is not permissible.

Synthetic flavoring compounds must be labelled, on both bottle and carton, so as to show the fact, as for an illustration: "Artificial Banana Flavor," "Artificial Pineapple Flavor," etc.

FLOUR:

Flour must be composed entirely of one single ground cereal. The admixture of other flours or materials constitutes an adulteration.

GLUTEN FLOUR:

Gluten flour is flour from which the starch has been washed, wholly or in part. Standard gluten flour must contain at least thirty (30) per cent. of proteids calculated by multiplying the nitrogen content by the factor 6.25 and not over forty-eight (48) per cent. of starch.

FRUIT JELLIES, FRUIT JAMS, PRESERVES, ETC.:

Fruit jellies, fruit butters, preserves, canned fruits, fruit conserves, confections, fruit juices and syrups, etc., must consist of the fruit specified on

the label, preserved only with cane sugar, with or without the addition of glucose, and *must not contain artificial flavors, coloring matters or preservatives.* If such articles contain any substitute for the fruit, or any foreign material to make up bulk or weight, *any artificial flavor, color or antiseptic,* or any substance not naturally occurring in such fruit, except spices or other wholsome flavoring materials, they shall be considered to be adulterated.

Jellies made from apple stock and variously flavored may be sold if properly labeled, as for illustration: "Fruit Jelly, Strawberry Flavor"; but such a product could not be sold for "Apple Jelly" or for "Strawberry Jelly." Preservatives prohibited. Saccharin must not be used.

HONEY:

Honey is the nectar of flowers and saccharin exudations of plants, gathered by bees. Honey made by feeding bees glucose, sugar syrup or other saccharin substance is not pure honey. Adding glucose sugar or syrup to honey or substituting these materials for honey constitutes an adulteration.

LARD:

Lard is the fat of swine, the fat being melted and separated from the flesh. Adding beef fat or stearine, cotton seed oil or other substitutes for swine fat constitutes an adulteration. Lard must contain not less than ninety-nine (99) per cent. of fat.

MILK:

Milk must contain three and one half (3.5) per cent. of fat and thirteen (13) per cent. of milk solids, except in the months of April, May, June, July, August and September, when it must contain three (3) per cent. of fat and twelve (12) per cent. of milk solids. Milk must not be skimmed, colored, watered, preserved with antiseptics, or produced from sick or diseased cows, or cows fed upon the refuse of breweries or distilleries. Milk from which the cream has been removed may be sold as skimmed milk from vessels, cans or packages on which the words "Skimmed Milk" are distinctly marked in letters not less than one inch in length.

MAPLE SUGAR AND SYRUP:

Maple syrup and sugar must be true to name. The chief element of value in maple syrup and sugar is the maple flavor, and any admixture of other sugars is an adulteration. (See law.)

MOLASSES AND SYRUPS:

All molasses and syrups are supposed to be made from the juice of cane or other sugar-producing plants, and any molasses or syrup containing

starch sugar, glucose or corn syrup shall be considered to be adulterated. Glucose syrups or corn syrups may be sold when so marked.

The sale of molasses or syrups containing sulphurous acid, sulphites, oxalic acid or salts of zinc, tin, or copper, or any other deleterious substances, is not allowable.

OLEOMARGARINE:

Oleomargarine, butterine, or kindred compounds, or mixtures of these with butter cannot lawfully be sold if colored in imitation of butter.

OLIVE OIL:

Olive oil is the expressed oil of the olive. The substitutes of other oils or fats for olive oil, either in part or in whole, constitutes an adulteration.

SACCHARIN:

The use of saccharin as a substitute for sugar in jellies, jams, preserves, fruit juices, syrups, etc., or in any other product is prohibited.

SAUSAGE:

Sausage must be prepared from the properly prepared edible parts of animals, and must contain no preservative other than sugar, salt, saltpetre, smoke and condiments, and no artificial coloring matter.

SPICES:

Spices are aromatic vegetable substances used for the seasoning of food. Standard spices are sound spices, true to name, from which no portion of volatile oil or other flavoring principle has been removed. All spices must be pure. Any mixture of any foreign article with any spice is an adulteration.[1]

SUGAR:

Standard sugar is white sugar containing at least ninety-nine and one half (99.5) per cent. of sucrose and without any added substance.

TEA:

Tea consists of the dried leaves of the true tea plant, without addition of artificial coloring matter or filler, or extraction of essential properties. Any article offered for tea which does not conform to this definition is adulterated.

VINEGAR:

Vinegar shall contain no artificial coloring matter and shall have an acidity equal to the presence of not less than four (4.0) per cent. by

[1] A preparation of mustard, vinegar, spices, and enough filling of starch to make a mustard of mild flavor, to meet a legitimate demand which undoubtedly exists, may be sold as "French Mustard" or "Prepared Mustard."

weight of absolute acetic acid. Cider vinegar shall, in addition, contain not less than one and six tenths (1.6) per cent. by weight of apple solids. If vinegar contains any artificial coloring matter, or less than the required amount of acidity, or if cider vinegar contains less than the required amount of acidity or cider vinegar solids, it shall be deemed to be adulterated. (See law.)

The foregoing list includes only a part of the foods of which the law takes cognizance in its general application, but it is, perhaps, not necessary to particularize further, as the foregoing list embraces most of the common articles of food liable to be adulterated.

SAMPLES FOR ANALYSIS—HOW COLLECTED.

Samples of foods, drugs, etc., are collected from time to time by agents of the State Board of Health in different parts of the state, for examination at the State Laboratory of Hygiene, the results being reported to the dealers.

Articles sent to the laboratory for examination should be forwarded in original, unbroken packages, with original labels thereon, accompanied by a statement of where the article was purchased. Articles which are not canned or bottled, but are sold in bulk, should be sealed, a paster placed upon it giving the name of the party who collected the sample and sealed it, from whom it was obtained and by whom manufactured. All such articles should be addressed, State Laboratory of Hygiene, Concord, N. H. Express charges should be prepaid. There is no charge for the work at the laboratory.

RELATIVE TO ADULTERATED LIQUORS AND THE EXAMINATION OF LIQUORS AT THE STATE LABORATORY OF HYGIENE.

The numerous applications made to the State Laboratory of Hygiene for the analysis of liquors (including beer, malt extract, Jamaica ginger, etc.), and the many inquiries regarding the law relating to the adulteration of liquors, make the following annnouncement necessary:

1. The Law. Herewith are given such extracts from. the Public Statutes as relate to and define adulterated liquors.

(Chap. 95, Laws of 1903, and Chap. 49, Laws of 1905.)

Section 1. The term "liquor" as used in this act includes and means all distilled and rectified spirits, wines, fermented and malt liquors and

any beverage which contains more than one per cent. of alcohol; and the word "person" shall include firms, associations, co-partnerships and corporations.

SECT. 17. It shall not be lawful

1. To sell or expose for sale, or to have on the premises where liquor is sold, *any liquor which is adulterated with any deleterious drug, substance or liquid which is poisonous or injurious to the health.*

* * * * * *

SECT. 21. Any commissioner, police officer, constable, special agent, selectman or sheriff may at any time enter upon the premises of a person who is licensed under the provisions of this act, to ascertain the manner in which such person conducts his business and to preserve order. Such officers may at any time take samples for analysis of any liquor kept on such premises, and the vessels containing such samples shall be sealed on the premises of the vendor and shall remain so sealed until presented to the State Laboratory of Hygiene for analysis. The city or town in which such vendor resides shall pay for the samples so taken, if such liquor is found to be of good quality and free from adulteration. If, however, such liquor shall prove to be *adulterated with any deleterious drug, substance or liquid which is poisonous or injurious to the health, or if such liquor prove to be other than it purports to be*, the licensee shall be fined two hundred dollars, shall forfeit his license and his bond thereon and such license shall not be renewed for at least three years from the date of its forfeiture.

(Chap. 269, Public Statutes.)

SECT. 3. If any food or substance to be eaten or used in any manner of food or *drink contains a less quantity of any valuable constituent than is contained in the genuine article, weight for weight, or contains any substance foreign to the well-known article under whose name it is sold . . . or contains any poisonous ingredient, . . . it shall be deemed adulterated within the meaning of this chapter.*

(Chap. 269, Public Statutes.)

SECT. 4. Whoever fraudulently adulterates for the purpose of sale any article of food or *drink*, drug or medicine, or knowingly sells any fraudulently adulterated article of food or drink, drug or medicine, or any kind of diseased or unwholesome provisions as defined in this chapter, shall be imprisoned not exceeding one year, or be fined not exceeding four hundred dollars.

* * * * * *

SECT. 10. Whoever adulterates, for the purpose of sale, any liquor used or intended for drink, with cocculus indicus, vitriol, grains of paradise,

opium, alum, capsicum, copperas, laurel-water, logwood, Brazil wood, cochineal, sugar of lead, or any other substance which is poisonous or injurious to health, or knowingly sells any such liquor so adulterated, shall be fined not exceeding one thousand dollars, or be imprisoned not exceeding one year.

2. EXAMINATIONS AT THE LABORATORY. The attention of prosecuting officers and other persons is called particularly to the fact that the State Laboratory of Hygiene is not required by law to analyze any liquors, except such as are collected by "any commissioner, police officer, constable, special agent, selectmen or sheriff," and that only "upon the premises of a person who is licensed" to sell liquors. This is the extent of this kind of work that will be done at the laboratory—except that the State Board of Health may, upon its own motion, under the provisions of chapter 269 of the Public Statutes, make such examinations for certain purposes. Examinations of liquors for criminal prosecutions in non-licensed places, or in any other manner except as provided for in section 21, above quoted, will not be made at the laboratory.

The chief reason for refusing to do this kind of work is that the time required of the chemist to testify to results in court would seriously interfere with and impair the work of the laboratory. The laboratory will make no examination of liquors for dealers or private individuals, or for manufacturers, breweries, etc., for any purpose whatever.

The legitimate work of the laboratory is confined to other channels: examinations of water supplies, food supplies, investigations of infectious and contagious diseases, etc., so that, necessarily, the above conditions must be complied with.

CONSUMPTION: ITS PREVALENCE, CAUSE, RESTRICTION AND PREVENTION.

NOTE.

This paper is also published in pamphlet form for general distribution among the people of New Hampshire, in order that a knowledge of the measures necessary to the restriction and prevention of consumption may be widely disseminated.

In its preparation the highest American and foreign authorities have been consulted, and in some instances liberal excerpts have been taken, the acknowledgment of which is made in this general way.

The term "Consumption" is used because it is by this name that the disease is better known everywhere. It refers to pulmonary tuberculosis (consumption of the lungs), and does not include other forms of tuberculosis, as tubercular meningitis, tabes mesenterica, scrofula, tubercular hydrocephalus, lupus, Potts' disease, etc.

The statistics given are from records of death from this disease in New Hampshire.

Local boards of health and physicians are requested to place a copy of this paper in the hands of every family in which there is a case of consumption. Copies will be furnished free for that purpose, upon application to State Board of Health, Concord, N. H.

THE PREVALENCE, CAUSE, RESTRICTION AND PREVENTION

OF

CONSUMPTION

A disease also known as "Tuberculosis," "Pulmonary Tuberculosis," "Phthisis," "Tubercular Consumption," "Pulmonary Consumption" and "Consumption of the Lungs."

By IRVING A. WATSON, M. D.,
Secretary State Board of Health.

Consumption (tuberculosis) is the most prevalent disease in New Hampshire, as it is elsewhere throughout the civilized world.

It destroys more lives than any other malady.

Its greatest mortality is among persons in the early prime of life.

It is a communicable disease.

It is a preventable disease.

It is a curable disease in a great majority of cases when taken in the incipient stages and treated in accordance with the best modern methods.

DEATHS IN NEW HAMPSHIRE, 1884-1904

COMPARISON OF WELL-KNOWN CAUSES

CONSUMPTION
DIPHTHERIA AND CROUP
TYPHOID FEVER
SCARLET FEVER
MEASLES
SMALLPOX

THE PREVALENCE OF CONSUMPTION.

Consumption is the most prevalent disease known to mankind. It is found in all civilized countries; in fact, in almost every community. It is no more prevalent in New Hampshire than in any other state. But little concerted action has yet been taken for its control. Legislation has provided for the restriction and prevention of other infectious diseases of far less magnitude. Boards of health are active to prevent the spread of diphtheria, typhoid fever, scarlet fever, measles and smallpox; more or less excitement follows their appearance, schools are closed, tourists seek other localities—yet the combined number of deaths from these diseases in New Hampshire is but little more than one half as many as from consumption.

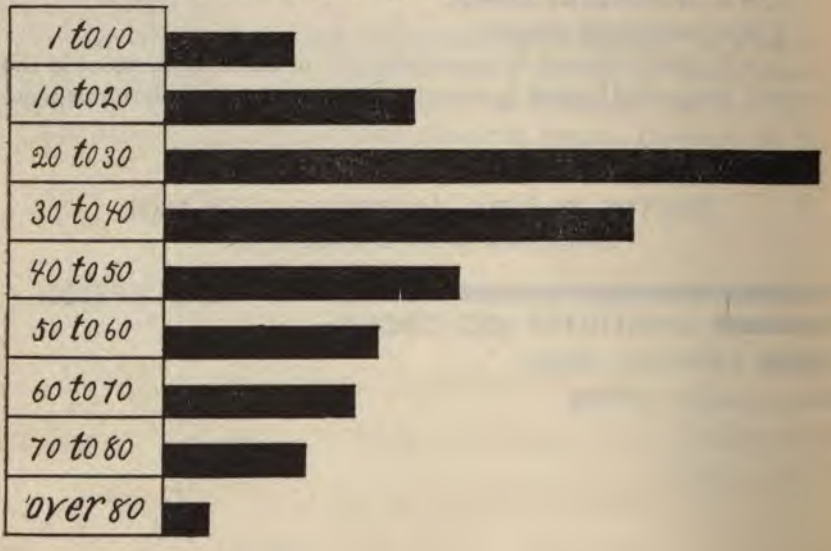
Not until the enactment of the law in 1903, prohibiting spitting in public places, the law of 1905, requiring the disinfection of premises after the removal or death of a consumptive person, and in the same year the act conditionally creating a sanatorium for consumptives, has this disease received legislative recognition by our lawmakers.

The Record of Facts.

By reason of a most accurate registration of deaths in New Hampshire, we are able to give facts relative to the causes of death and thereby are prepared to show the exact status of consumption, its ratio to other diseases and to age-periods, and shall do so that the magnitude of its ravages may be better understood by the people, believing that when its appalling destruction of life is comprehended, its restriction, prevention and cure understood, more logical and strenuous efforts will be inaugurated for its control, through state, municipal, charitable and individual coöperation.

Nearly seven hundred deaths a year from consumption has been the average in New Hampshire for the period 1884 to 1904—a total of 14,611—an astounding mortality from a communicable disease that is largely preventable.

Deaths from Consumption in New Hampshire, 1884–1904, by Ages.



Mortality in the prime of life.—The above diagram gives a graphic idea of the tremendous mortality from consumption in men and women in the very prime of life, between the ages of twenty and forty years. This is a period when the economic loss to the state is something enormous, when a great productive army is cut down, women and children left destitute, and a legion of irreparable damages entailed.

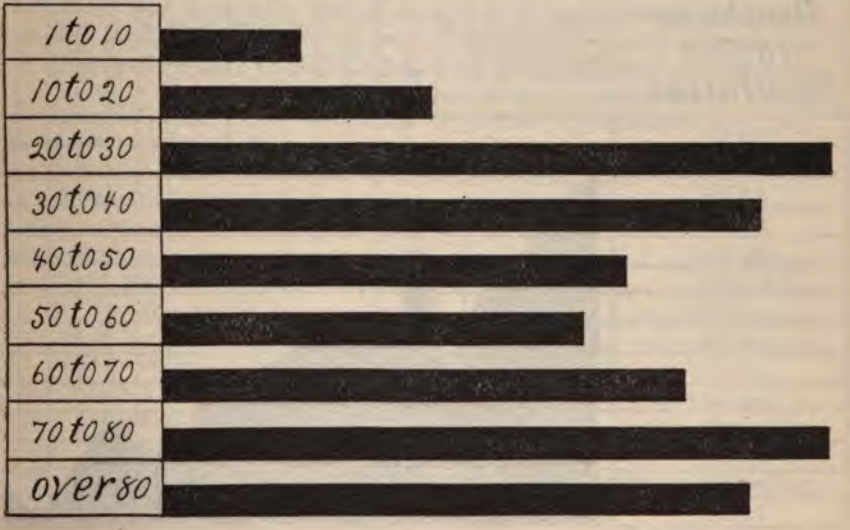
Diagram showing proportion of deaths from pulmonary consumption to deaths from all other causes in New Hampshire between the ages of twenty and thirty years, for a period of twenty years—1884 to 1904, inclusive:

BLACK—Consumption.
WHITE—All other diseases.

During this period there died in New Hampshire, from all causes, between the ages of 20 and 30, 10,028 persons, of whom 3,981 succumbed to consumption; or, in other words, 39.69 per cent., or one to two and a fraction deaths were caused by consumption.

No age exempt from consumption. From infancy to old age this disease finds its victims.

Mortality from consumption to each 10,000 of the population of same age period, in New Hampshire, for 20 years:



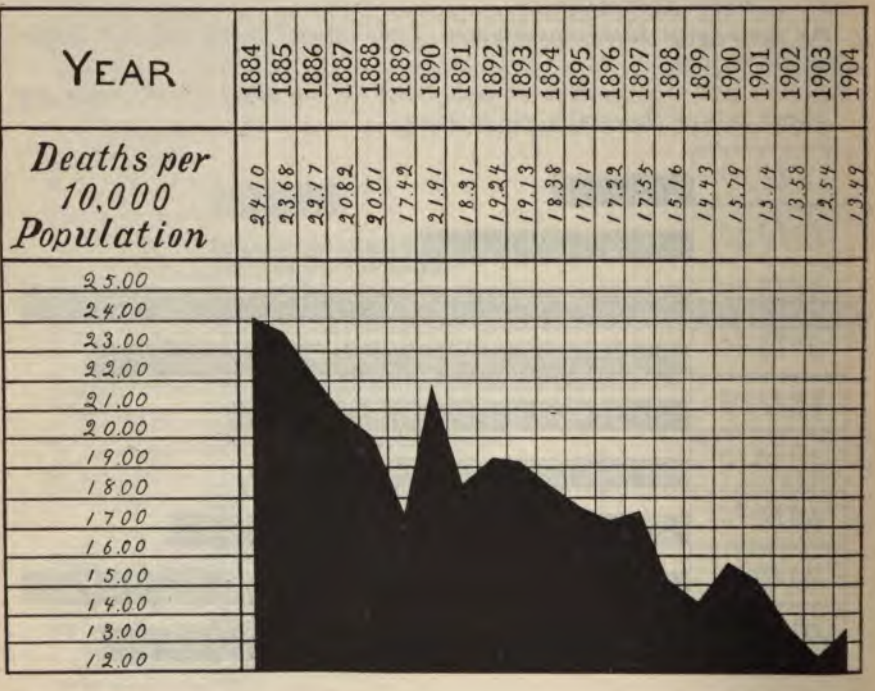
The above diagram represents the relative liability to the disease by age-periods. While the *mortality* from consumption is very much greater during the age period, 20–30, because the population of that period is greater, the individual *liability to contract the disease* is as great between the ages of seventy and eighty, and not very much less in some of the other age periods —in fact, no age is exempt from this malady.

Fourteen thousand six hundred and eleven deaths from consumption in New Hampshire in 21 years are shown and partially analyzed in the foregoing statement and diagrams, the purpose being to awaken the public to an appreciation of the terrible magnitude of this disease and thereby to stimulate unceasing efforts to suppress it.

A Great Reduction Already Accomplished.

Consumption can be controlled, as evidenced by the fact that it has been decreased to a remarkable degree in the past 21 years in New Hampshire, as it has been elsewhere. This has been due, undoubtedly, to a better understanding of the nature of the disease; the exercise of more or less precaution against infection, formerly neglected; improved environments of the laboring classes; better hygienic conditions in the homes; food, ventilation, etc.; and, further, to the fact that in recent years many cases of consumption have been cured.

Chart showing deaths in New Hampshire from consumption per 10,000 population, for 20 years—1884 to 1904, inclusive.



The diminution in the mortality from consumption is illustrated in the diagram given above, which represents the actual death rate from 1884 to 1904, inclusive. In 1884 there were 868 deaths from pulmonary consumption. The lowest point reached was in 1903, with 530 deaths. In 1904 there were 575 deaths from this disease.

In commenting upon the reduction of consumption in New Hampshire during the past 20 years, the State Board of Health, in its last report, says:

Unless sanatoria are provided for the treatment of indigent tuberculous patients and for those who have not the means sufficient to secure proper treatment, it is not to be expected that the rate of decrease in the mortality from this disease which has been shown can possibly be maintained. In all probability the diminution which has taken place has been largely among the so-called better classes, or, in other words, among the more prosperous, and perhaps more intelligent, part of the community. It is these persons who are better informed and pay more attention to sanitary progress, and who, moreover, have the means at their command to enable them to do so. To reduce tuberculosis to its lowest terms, sanatoria become a necessity.

WHAT CONSUMPTION IS.

Consumption (more properly speaking, tuberculosis of the lungs), generally looked upon as a wasting disease and known in all communities, is caused by the growth of a specific germ in the tissues of the lungs, and without this germ there can be no consumption nor other form of tubercular disease. This germ is known as the *tubercle bacillus*, and to prevent consumption it must be kept out of the way.

Consumption is rarely, if ever, inherited. but is contracted from another case, and to have the disease the germ must be inhaled or swallowed. Children of consumptive parents often inherit weakened constitutions, predisposing them to the disease, which they readily acquire from others, whence arose the former belief that the disease was hereditary.

There are two conditions always necessary to establish a case of consumption: First, the presence of the germ, as the specific cause; secondly, the individual must be in a receptive state, either through heredity, alcoholism, poverty, over-work, nervous exhaustion, bad sanitary environments, lack of ventilation, etc., thereby so weakening the powers of resistance as to furnish a suitable soil for the germs of consumption to invade. Mal-nutrition, from whatever cause, contributes largely to this end. But no matter how feeble or debilitated a person may be, he can never have consumption unless he takes the specific germ of the disease into his system.

Consumption is communicated chiefly through the dried sputa of consumptives. This, in the form of dust, is inhaled or swallowed. Or the infection may be conveyed by drinking-glasses, eating utensils, or other articles which have been used by the consumptive, or, possibly, through infected meat, milk or other food.

How infected dust plays its part in the spread of consumption may be readily understood when it is known that the spit of a consumptive person contains thousands, and probably millions, of the germs, and through the thoughtless habit of expectorating in public streets, highways, halls, railway

stations, cars, about the premises or in their own apartments, these germs are deposited where, after they have become dried, every current of air, the act of sweeping sidewalks or rooms, the trailing of skirts, etc., distributes the infection to an extent that cannot be realized and is not often understood.

Tuberculous milk and meat are believed by many good authorities to contribute, also, to the spread of consumption.

Consumption is a communicable, preventable and curable disease.

PREVENTION.—HOW TO AVOID CONSUMPTION.

The important points in the prevention of consumption are: Pure air, sanitary surroundings, an abundance of light, fresh air and cleanliness in the dwelling, office and workshop, proper clothing, good food properly cooked, moderate rest and recreation, avoidance of all excesses; in other words, moderate living. The excessive use of alcoholic liquors lowers vitality, favors infection and hastens a fatal termination.

Everyone should be prepared to battle with consumption. The disease spares no class of people. It spreads its terrors in the huts of the poor and the dwellings of the rich. Weakly persons, particularly those who have been exposed to the disease, or those descended from consumptive parents, should constantly be on their guard against this disease. These persons should seek outdoor occupations. (Illinois State Board of Health.)

Do not spit where the sputum may become dry and be disseminated as dust.

"NO SPIT, NO CONSUMPTION."[1] Obey the law.

SPITTING

On the Sidewalk or Floor of any car or Public Building is

FORBIDDEN BY LAW

FINE $10.

The State Board of Health calls attention to the following statute:

"It shall be unlawful for any person to spit upon any sidewalk, in the compact part of any city, village, or town, or in any railway station, hall, or other public place, or in any street or steam railway car other than smoking cars, except into spittoons or other receptacles provided for that purpose.

"It shall be unlawful for any person to throw upon the sidewalk, or into any public street, in the compact part of any city or village, any waste matter from any fruit or any paper or other offensive or unsightly substance.

"Any person violating the provisions of this act shall be punished by a fine not exceeding ten dollars." [Chap. 2, N. H. Sess. Laws, 1903.]

[1] This is a phrase often and emphatically repeated by the Illinois State Board of Health in its literature on the causes and prevention of consumption.

Police officers and boards of health should see that the law is enforced in every city and town in the state. If you see it violated make complaint against the offender.

Another duty imposed by law. Every death and removal of a consumptive must be reported and the premises disinfected.

Section 1. It shall be the duty of the attending physician or some member of the patient's family or household to report every death from pulmonary consumption, or the removal of a consumptive patient, to the local board of health within one week of said death or removal.

Sect. 2. It shall be the duty of said local board of health, within one week after such notice or such information from any other source, to cause the infected premises to be thoroughly disinfected and cleansed; said work to be carried out by methods endorsed and recommended by the State Board of Health.

Sect. 3. No apartments which have been occupied by a consumptive shall be re-occupied until thoroughly disinfected and cleansed as provided for in this act.

Sect. 4. Any person violating the provisions of this act shall be punished by a fine of fifty dollars for each offence.

Sect. 5. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.—[Chap. 17, N. H. Sess. Laws, 1905.]

The greatest danger of infection is in the house—the dwelling, the workshop, the office—where the sun and air play a far less active role than outdoors. In dark places especially do we find greatest danger. Alleys, courts and rooms shut off from light are special breeding places of consumption.

The house is the granary of the *tubercle bacillus* outside of its host. Were it not for the house the *tubercle bacillus* would soon have to perish from the face of the earth. It could not be preserved. Sunlight, air and water are its natural enemies.—(*Flick.*)

Fresh air and sunlight is the greatest protective agency. Do not live in a room or office where there is no fresh air. Never sleep in a room that is not well ventilated—keep one or more windows open in all kinds of weather. Bad air impairs the resisting powers of the system. Fresh air fortifies against infection. Have fresh air at all times and sunlight wherever and whenever possible.

Keep your premises clean. Damp and dirty cellars, dark rooms and unsanitary surroundings tend to debilitate and thus increases susceptibility in infection of all kinds.

Attend carefully to personal habits.

Keep the body clean. Bathe frequently.

Exercise daily in the open air in cold weather or in warm. Walking, rowing, swimming, cycling, golfing, horse-back riding or other exercises causing deep breathing are all of advantage if practised in moderation. Walk erect. Breathe through your nostrils always.

Use every endeavor to cause the consumptive with whom you live, work or associate to properly dispose of his sputum.

[1]Instructions to local boards of health were published in the New Hampshire *Sanitary Bulletin*, April, 1905, and a copy sent to every health officer in the state.

If you are a woman do not wear skirts which sweep the sidewalk of the spit of the consumptives and other filth and thus carry disease into the house.

Don't put in your mouth money or articles which have been promiscuously handled by others.

Don't put your finger in your mouth or nostrils unless it is perfectly clean.

Don't neglect to wash your hands before you eat.

Don't neglect a cold or cough. Countless graves are filled with those who have done so. Colds reduce the vital forces of the body and make it easy for the germ of consumption to get a foothold in the lungs. The history of a large percentage of consumption cases is the history of neglected colds.

Do not move into a house where the last occupant was tuberculous, without an effective disinfection of the premises.

Do not share a consumptive's bed, nor use the personal property, including dishes, belonging to one.

Dampness of soil upon which the house stands and dampness of the immediate locality are to be avoided.

A pure water supply is essential. Water from wells near privies, sink-drains, barnyards, etc., should be looked upon with great suspicion at least.

Adequate ventilation should be provided for all almshouses, jails, halls, schoolhouses, factories, shops and other buildings where people assemble in considerable numbers. Such places should be occasionally thoroughly disinfected.

EARLY SYMPTOMS SHOULD BE RECOGNIZED.

If consumption were recognized in its early stages and the proper course of treatment followed, many recoveries would take place in cases that otherwise progress to a fatal termination.

The first symptoms of the disease usually are loss of appetite, disturbance of the digestive functions, languor, lack of energy, pulse increase, a slight feverish condition in the afternoon or evening, occasional chills and a hacking, or hawking, cough, more noticeable in the morning. These symptoms vary more or less according to the degree and location of the infection and the habits and the idiosyncrasies of the individual.

The patient is very apt to overlook the earlier symptoms of consumption until it becomes difficult for him to perform his daily labors or ordinary duties. Consumptives are almost invariably optimistic. They attribute their symptoms to dyspepsia, biliousness or a run-down condition, and the cough they regard as of no account or call it "a little bronchial irritation."

The invasion of the disease is so insiduous that it often becomes deeply seated before it is recognized. The initial symptoms above described should arouse the suspicions of the patient and he should at once seek the best medical advice.[1]

For the patient to neglect advice and treatment until he is obliged to cease work, when, perhaps, more serious symptoms, as flushed cheeks, night

[1] The physician is offered free facilities for having sputum examined at the State Laboratory of Hygiene. This is to aid him in arriving at a definite opinion in the case. In the early stages of consumption the bacillus may or may not appear in the sputum, therefore a negative result from the examination of a given specimen of sputum is not, by any means, conclusive; a positive result, of course, shows infection.

sweats, increased expectoration and, perhaps, hemorrhage from the lungs have taken place, means that his chances for recovery have been greatly diminished. Consumption is a readily curable disease in a majority of cases when treatment is commenced in its incipiency.

CONSUMPTION A CURABLE DISEASE.

The curability of consumption is proven beyond all question. Thousands of cases are arrested or cured every year. Sanatorium statistics show that a large majority of their incipient cases recover. Physicians every year have cases that get well. Even spontaneous recovery sometimes occurs, as shown in *post mortem* examinations of persons who have died of some other disease.

Every consumptive should early seek the advice of some physician (one who has given special attention to this disease, if possible), and follow his recommendations as closely as circumstances will permit.

An eminent English authority says:

"Consumption in the early stage can be arrested much more certainly and effectually and quickly that when it is advanced, and as the danger of infection then is also very much less, it is much to be regretted that cases are not commonly recognized earlier, and that so many are allowed to drift into the hopeless stage. All persons suffering from consumption in the early stage should be trained in the modern method of arresting the disease, which comprises: Continuous exposure day and night for some months to unlimited fresh air, whatever the weather or season; ample shelter from cutting winds, driving rain and oppressive heat; abundance of sunshine; a quickly drying soil; superabundance of animal and other nourishing foods; rest and exercise, carefully regulated according to the condition of each patient; freedom from care and worry; daily cold sponging; careful treatment of the spit; and continuous supervision by an experienced medical man. These requirements are best obtained in a fair-sized sanatorium in the country under the care of a resident medical officer."

Dr. Lawrence W. Flick, of Philadelphia, director of the Henry Phipps Institute, a recognized authority on the treatment of consumption, says: "Tuberculosis can be cured in any climate. All that is necessary is life in the open air, proper food, well regulated and carefully disciplined conduct and, in more advanced cases, properly directed rest and exercise. People who can command these things at home can be cured in their homes. People who cannot command them should be treated in sanatoria. Most people can be treated better in sanatoria than in their homes."

A CONSUMPTIVE NOT NECESSARILY DANGEROUS.

Consumption cannot be taken from the breath of a patient. Consumptives who are careful with their sputum, who see that it is properly disposed of, will not endanger others. Such persons are not to be avoided or excluded from any of the social or business affairs of life.

Knopf, one of the highest authorities upon this subject, says: "Prolonged contact with the consumptive who takes care of his expectoration and other secretions which may contain the bacilli is absolutely without danger. In

sanatoria for consumptives where the precautions concerning the sputum are most strictly adhered to, one is perhaps safer from contracting tuberculosis than anywhere else. The great danger from tuberculosis lies in the indiscriminate deposit of tuberculous sputum, which, when dry and pulverized, may be inhaled by susceptible individuals and then cause the disease to develop."

The true nature of consumption should be understood, that earnest and intelligent means may be carried out to prevent its spread; but to do this no individual alarm should be aroused. The consumptive patient who exercises the personal care and attention that his case requires, is no more dangerous to a community than is any other individual.

Fright is folly; but public and personal hygiene along the lines recommended is absolutely necessary.

IF YOU HAVE CONSUMPTION.

Never spit where the sputum can become dried.

Take every precaution named and suggested in this circular. It states how the sputum may be taken care of properly.

It is not necessary that you give the disease to others. You can avoid doing so by practising the precautions herein recommended.

Do not swallow the sputum you cough up. It is liable to re-infect you if you do. It might prevent your recovery.

Remember that the sputum contains thousands, and even millions, of the germs that cause consumption.

Have courage and be cheerful. Excitement, worry, despondency are powerful factors in aggravating the disease, while, on the other hand, a hopeful, determined courageous effort is equally as potent a curative agency.

The patient should understand that much depends upon himself in carrying out all the essentials to a successful treatment. Medicines are of far less importance than correct living, proper food, suitable exercise or rest (according to condition), and an out-of-door life.

Avoid patent medicines and all advertised cures for consumption. There is no medicine known that will cure consumption. Medicines have their proper place in regulating the functions of the body, but should never be used except under the best medical advice.

Live out of doors. You cannot get well living in warm, unventilated rooms. The fear of fresh air has killed thousands; its use, day and night has cured thousands. If you are obliged to live indoors, have a large, sunny room, if possible, and keep some or all of the windows open day and night. Always sleep with the windows open. Have plenty of clothing to keep the body warm. Avoid living on low, damp soil, if possible; dry, porous land is much to be preferred.

Cases of consumption must be individualized in many of the details of treatment, hence it is essential that the patient have regular medical supervision. It is necessary that the temperature, pulse and other conditions be watched and exercise, rest, diet, etc., be regulated accordingly, not to mention the giving of such incidental remedies as it may be necessary to administer to alleviate unfavorable symptoms and to promote the comfort of the patient.

The Massachusetts General Hospital has issued the following leaflet, which gives, in brief, advice that should be followed:

FRIENDLY ADVICE TO PERSONS HAVING DISEASES OF THE LUNGS.

Although you may have trouble in your lungs and be suffering from the disease called tuberculosis, you may get well, as thousands of others have done, by strict adherence to the following rules:

Be out in the fresh air as much as possible.

If you cannot have work out of doors, go to the house door or to an open window and take 12 full breaths. Do this six times each day.

Do not work in a dusty place.

Get in the sunshine as often as you can.

Sleep in a clean, well-aired room with windows open, and go to bed early.

Avoid crowded rooms where the air is close and where there is much smoking.

Eat plain, simple foods (eggs, meat, bread, oatmeal, marcaroni, rice, vegetables, milk, cream and butter).

If possible, have some hot liquid food before you get up in the morning and at bedtime.

Spend your money for good food rather than for medicines.

Do not drink whiskey, rum, gin, brandy or beer.

Keep clean.

Take a sponge bath each morning. Rub the skin well with a coarse towel.

Do not swallow what you cough up.

Protect your friends and neighbors from taking this disease from you by burning what you cough up or by throwing it down the water-closet. What you cough up contains the germs of the disease, and, if it dries, it soon becomes dust and flies about in the air, and your friends, breathing this dust, are liable to catch your disease.

Never spit upon the floor or in the street.

Do not spit into your handkerchief, but use a spit cup or have small pieces of cloth or soft paper to spit into. Do not put them into your pocket, but collect them in a paper bag and burn bag and all when you get a chance.

Try not to cough.

When you must cough, hold a piece of cloth in front of your mouth, so that particles shall not fly out into the room.

Do not sleep with another person.

Have your knives, forks and spoons washed with boiling water.

Handkerchiefs should be boiled for half an hour before washing.

The Illinois State Board of Health sums up the essentials in the treatment of consumption as follows:

Live "out of doors" day and night, winter and summer. WEAR PROPER CLOTHING. Have no fear of night air and none of draughts. Court the sunshine. Avoid damp houses or rooms. Avoid crowds, smoke and dust. Avoid all excesses. Be careful that you do not exercise when you should rest. Eat plenty of good nourishing food. Drink plenty of good water. Keep your body clean. Take no drugs except on the advice of a physician. Never swallow the sputum which you hawk or cough up. Be hopeful and cheerful.

THE SPUTUM SHOULD BE DESTROYED.

The sputum of a consumptive person should never be deposited where it can become dried and scattered about as dust. In the house cuspidors, spit cups or flasks, in which there is a disinfecting fluid, should be used. These articles should be washed daily in a disinfecting fluid, or be boiled in water for a half hour or more.

There are in use several kinds of pocket spit flasks, which are of great utility to consumptives when traveling about or away from home, or even for use at all times.

A pocket-handkerchief should never be used as a receptacle for sputum. In its place a number of pieces of rags, or, less preferably, a paper napkin, should be used and be burned before becoming dry. Each piece after use may be deposited in a paper bag, which can be carried in the pocket and the whole burned. Or a rubber pouch, similar to that used for tobacco, may be employed, the contents burned and the pouch disinfected by boiling. Never let the sputum become dry.

"No spit, no consumption."

IN THE SICK ROOM.

Consumption lives in the house. There is where it is preserved to infect others. Its home is where sunlight and fresh air are excluded; where strict cleanliness does not prevail; where carelessness of habits and heedlessness of hygienic matters are to be found. It is, therefor, necessary wherever a case of consumption exists that regular and unremitting care shall be taken to protect others of the family. The patient must not, and need not, infect others. If the patient is able to be about, not confined to his room, he can so conduct himself as not to endanger others; but if bed-ridden, then a great part of the details of protection against infection must rest with the attendants.

The patient's room should be large, sunny and well ventilated at all times. Carpets, draperies, upholstered furniture, ornaments, etc., should be dispensed with as far as may be consistent without sacrifice or comfort.

Cuspidors and spit-cups should at all times contain a disinfecting fluid that will destroy the germs in the sputum. If bits of cloth or old handkerchiefs are used by the patient, they should be burned before they become dry or be immersed in a disinfecting solution before being washed. Sheets, pillow cases, etc., should also be immersed in the solution, or in boiling water, for half an hour.

No dusting should be allowed, but instead all woodwork should be frequently wiped with a damp cloth, which should be immersed in the disinfecting pail or tub, or be immediately burned. All dishes, glasses, spoons, etc., used by the patient should be immersed in boiling water for a short time.

Kill all the germs that come from the patient, then no one can contract the disease from him. This can be done if instructions are carried out constantly, so that there may be no break in the chain of efforts.

In cases of death qualified undertakers in this state will prepare the body so that it will not endanger persons who attend the funeral. No one should

be allowed to visit the room occupied by the patient until after it has been thoroughly disinfected by the board of health, as the law requires.

The funeral must not be held in that room, unless disinfection has been performed as required previously to the ceremony.

Within one week after death or removal of a consumptive patient, the board of health must be notified by the attending physician or some member of the family (fifty dollars' fine for neglect to do so). (See law, page 259.)

Bodies dead of consumption that are to be shipped by rail or other public carrier must be prepared in accordance with Rule 3 of the Regulations for the Transportation of Dead Bodies, as legally established by the State Board of Health, with the conditions of which all regular undertakers in this state are familiar.

CHANGE OF CLIMATE.

A change of climate is not recommended as an essential to recovery, neither is it advisable, except under the most satisfying and satisfactory conditions. The experience of thousands in years past, who expected recovery or at least, great benefit from climatic change, has shown that it is in itself a delusion.

In exceptional changes benefit may follow, but it is now an established fact that with sanatorium facilities patients can be more successfully treated in a climate approximating, at least, that in which they reside.

Consumption can be as successfully treated in the latitude of New Hampshire, and even much farther north, as anywhere else in the world. Patients who go to Florida, Colorado, California, or to other remote localities in order to be restored to health by the climate, labor under marked disadvantages as compared with proper treatment in the climate in which the patient has lived and is to reside afterward.

The State Board of Health of California, in its monthly Bulletin, says:[1] "An average of almost one death a day occurred in November in California from tuberculosis, among those who had been here less than one year. What a price to pay for the reputation of California as a health resort! The slight increase of our death-rate is no factor. The pecuniary cost, great as it is, is of little account, as we can produce more wealth. The danger from the many extra sources of infection, though a grave thing, can be overcome by care and disinfection, but the untold sufferings of the poor victims, a needless and cruel thing, can never be properly atoned. Buoyed up by false hopes and anticipations, oftentimes given them by those who know better, many left their homes where there was plenty of fresh air, plenty of food, with friends to care for them, to go to a strange country without friends or funds, where fresh air and sunshine are free, but where it takes material wealth to get food and care. There is probably no class of patients that suffer more from homesickness or long for the tender ministrations of friends than these, and there certainly is none with whom the balance for life or death is more influenced by the surroundings and mental condition. * * * The objection is not on financial grounds alone, but on humanitarian, for it is cruel in the

[1] November, 1905.

extreme to send patients suffering from tuberculosis, or any disease, among strangers to die."

If for special reasons a change of climate or location is desired or recommended, the patient should be sure that he will have as good care and general conveniences as he enjoys at home; pure air, good water and food, sanitary conditions, companions, amusements, agreeable environments, and all the details essential to comfort of mind and body. He should also be sure of having the best professional advice.

No consumptive patient who has but little money, but who is still able to work, should, under any circumstances, go into a different or a warmer climate expecting to support himself there and to improve his health at the same time. Unless he has ample means to provide for his every need for a considerable period, he should remain at home. A change of climate may, in the earlier stages of the disease in exceptional cases, be of benefit to the wealthier classes, who are able to surround themselves with all that is necessary in every particular for their welfare.

A change of environment may sometimes be of benefit, but to expect a cure from a change of climate alone is fallacious.

OPEN-AIR TREATMENT AT HOME.

In some instances, where conditions are favorable, a home treatment approximating the methods of a sanatorium can be inaugurated and successfully carried out under the watchful supervision of an attending physician.

We have in this state some apparent recoveries, even in cases that were considerably advanced, through the adoption of the out-of-door plan of treatment. One notable instance was that of a woman in whom the disease was so far advanced that little or no hope was entertained for her recovery. She was taken upon a bed, in the early spring, to a tent upon a hillside in the country. The location was upon a farm, where fresh cream, butter, eggs, etc., could be obtained daily. The walls of the tent were never closed, day or night, except during a driving rain. Every essential detail was attended to by a physician and attendants. The result was that the patient returned to her home in early autumn apparently perfectly well and weighing more than she had ever before weighed.

Another case was that of a young girl in whom the disease had made considerable progress before a physician was consulted, which was in midwinter. Arrangements were immediately made to keep her in the open air constantly. Wrapped in a big fur overcoat, she reclined upon the porch during the day and slept at night in a room with windows wide open. A skilled physician had supervision of the case, as is always necessary. The result was a rapid arrest in the progress of the disease, a marked improvement in a few weeks, and before the opening of spring she had every appearance of perfect health; the bacilli had disappeared from the sputum, and she was romping with her schoolmates as formerly.

These two cases, although they are probably extreme ones, serve to emphasize the importance of pure air, for without it none of the physicians who saw these cases believes that their recovery would have been possible.

At some homes this method might be carried out when sanatorium treatment is impossible to obtain. On the other hand, there are a great number

of instances the circumstances of which render it impossible to do even this much and for all such sanatorium treatment is an urgent necessity.

SANATORIUM FOR CONSUMPTIVES.

A sanatorium for the treatment of consumptives located at the proper elevation, remote from cities and villages (that the air may be free from dust), reasonably accessible and commanding suitable exposure and cheerful view, protected from the severest winds of winter, supplied with an abundance of pure water and properly equipped in other details, is what the state has long needed and which is, we trust, almost in sight.

The sanatorium method of treatment, which embraces, in brief, pure air and abundance of food, daily baths, exercise or rest (according to the condition of the patient), regular hours for meals, sleep and rest, daily supervision of all essential details—all under the immediate direction of an experienced physician—offers far greater chances for recovery than any other. Statistics of several hundred sanatoria in this and other countries prove this assertion. It is not necessary to quote them, for the facts are now a matter of public knowledge. The state has recognized it in the act of the Legislature of 1905, in appropriating $50,000 for a state sanatorium, to be available in May, 1907, if an institution of the kind, that shall be deemed satisfactory by the governor and council and the secretary of the State Board of Health, is not provided for in the meantime through private funds.

The pressing need of a state sanatorium, to provide treatment for the great majority whose resources are not sufficient to allow of their going to an established sanatorium in some other section of the country (even if they could be admitted), is apparent to all who consider the question for a moment, and is not infrequently most pathetically emphasized in appeals to the State Board of Health for assistance of this kind. From time to time letters are received making application for admission to some sanatorium for treatment, the applicant realizing that without such aid his case is hopeless, or practically so. Most of these applicants have been in the early stage of the disease, just the time when successful treatment could almost positively have been assured had facilities been provided; but every appeal during the past two years has been in vain, there being no appropriation available for their assistance. We trust that the end of this state of affairs is not far distant.

DISINFECTANTS.

Much of the so-called disinfection practised in families is wholly inefficient and useless. The burning of coffee, tar, sulphur, or other substance in the sick-room or in any other part of the house or premises in the presence of the patient or other persons operates, at most, only as a deodorizer, and does not destroy the germs of the disease.

It should also be known that many of the preparations offered for sale as disinfectants, germ killers, etc., are worthless, or nearly so, and should never be relied upon.

Reliable formulas are given by which a family may make disinfectant solutions possessing the required strength and efficiency, and at much less cost than is asked for proprietary preparations.

DISINFECTANTS TO BE EMPLOYED.

For general household purposes the following formulas for disinfectant solutions are both satisfactory and cheap:

Solution No. 1.

Chloride of lime (bleaching powder), one pound; water, three gallons. Mix. Cost, about three cents per gallon.

Care should be taken to obtain *fresh* chloride of lime.

This solution is so cheap that it can be used with great freedom, and it is one of the best disinfectants known. A quart or more per day may be used in an offensive vault, and such quantities as may be necessary in other places. It may be used as a sprinkler in stables and elsewhere. In the sick-room it may be used in vessels, cuspidors, etc. Sheets and other clothing used by the patient may be immersed in a pail or tub of this solution, diluted (one gallon of solution to 10 of water), for two hours, or till ready for the wash-room or laundry. This solution is non-poisonous and does not injure white clothing.

It may also be used for washing the hands or other parts of the body which may have been exposed to infection from excreta, etc.

For a free and general use in privy vaults, sewers, sink-drains, refuse heaps, stables and wherever else the odor of the disinfectant is not objectionable, this is one of the cheapest and most effective disinfectants and germicides available for general use. It should be used so freely as to *wet* everything required to be disinfected. Its *odor* does not disinfect—only covers up other odors.

Solution No. 2.

Corrosive sublimate, one ounce; permanganate of potash, one ounce; water, eight gallons. Mix and dissolve. Label, POISON. Cost, two to three cents a gallon when chemicals are bought by the pound. Stains fabrics, etc.

Use the same way and for the same purpose as No. 1. The only advantage this has over No. 1 is the fact that it possesses no odor. It is poisonous, but its bright purple color will prevent its being mistaken for any other solution. It should be used in vessels, cuspidors, etc., in case of infectious or contagious disease when solution No. 1 is objectionable on account of its odor. It is not so good a disinfectant for vaults, sink-drains, sewers, etc., as the chloride of lime solution. It should not be kept in metallic vessels.

Solution No. 3.

Dissolve one drachm (60 grains—1-8 ounce) each of corrosive sublimate and muriate of ammonia in one gallon of water. Dissolve in a wooden tub, barrel or pail, or an earthen crock. Label, POISON. Cost, about the same as No. 2.

Use for the disinfection of soiled underclothing, bed linen, etc. Mix solution with equal quantity of water and immerse articles for four hours. Then wring them out and boil them.

Mixed with an equal quantity of water the solution is useful for washing the hands and general surfaces of the bodies of attendants and convalescents. The latter only by direction of the physician.

Solution No. 4.

MILK OF LIME (QUICK LIME.)

Slake a quart of freshly burnt lime (in small pieces) with three fourths of a quart of water—or, to be exact, 60 parts of water by weight with 100 of lime. A dry powder of slaked lime (hydrate of lime) results. Make milk of lime not long before it is to be used by mixing one part of this dry hydrate of lime with eight parts (by weight) of water.

Air-slaked lime is worthless. The dry hydrate may be preserved some time if it is enclosed in an air-tight container. Milk of lime should be freshly prepared, but may be kept a few days if it is closely stoppered.

Quick lime is one of the cheapest of disinfectants. This solution can take the place of chloride of lime if desired. It should be used freely, in quantity equal in amount to the material to be disinfected. It can be used to whitewash exposed surfaces, to disinfect excreta in the sick-room or on the surface of the ground, in sinks, drains, stagnant pools, etc.

Solution No. 5.

Solution of formaldehyde (formalin), six ounces; water, one gallon. Mix. Cost, eight or ten cents. Contains a little less than two per cent. of formaldehyde.

This solution may be used in the same manner as those above described. It has the advantage of not bleaching fabrics, and is especially good for washing furniture, woodwork, etc.

The disinfecting solutions above given are for use in connection with the patient during illness, and for such general family use as may be indicated.

Disinfection after death or removal of a consumptive patient must be performed by the local board of health in accordance with the law. (See page 259.) The State Board of Health has given instructions and method to be employed in such cases in the *Sanitary Bulletin* of April, 1905.

TYPHOID FEVER: PREVALENCE, CAUSE, RESTRICTION, PREVENTION.

TYPHOID FEVER: ITS PREVALENCE, CAUSE, RESTRICTION AND PREVENTION.

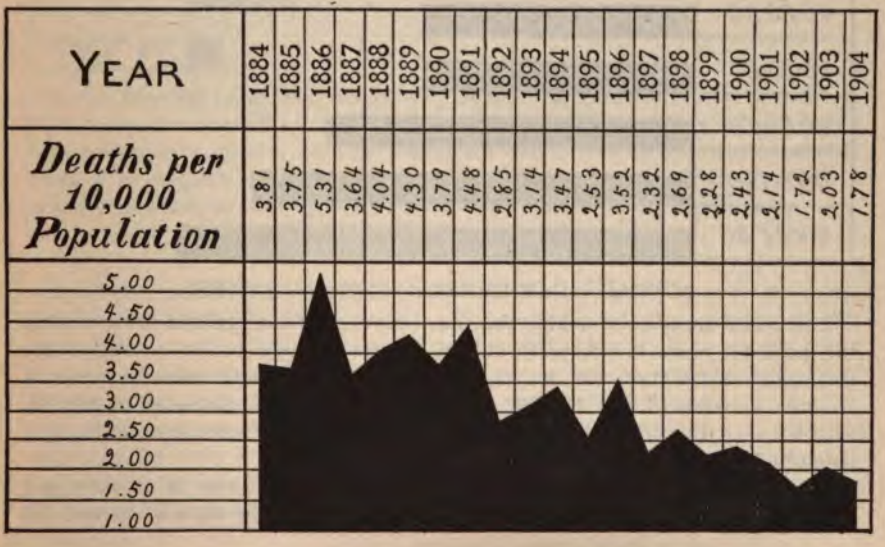
Typhoid fever is a communicable disease of protracted duration and found in all countries and under all conditions of climate. It is one of the preventable diseases and sanitarians and physicians very generally agree that there is no cause for its existence in any community. This opinion is based upon a thorough knowledge of the nature and character of the disease, the well-understood methods of infection and the further fact that it is often directly and positively controlled by modern measures. Notwithstanding this, there are between 350,000 and 400,000 cases of this disease with 35,000 deaths every year in the United States. Its widespread prevalance is due largely to public ignorance or indifference to the measures which can and should be taken to prevent it.

ITS PREVALENCE IN NEW HAMPSHIRE.

From 1884 to 1904, inclusive, there were returned to the Department of Vital Statistics, 2,543 deaths from this disease, a yearly average of 120. For every death from typhoid fever it is estimated that there are from twelve to fifteen cases that recover. Basing our calculations upon the lowest estimate, we should have an annual average of nearly 1,500 cases for the period named, or a total of over 30,000 cases in the past 21 years.

The deaths from typhoid fever have been very materially reduced in the past few years below the annual average for the period above given. The number of deaths from typhoid fever returned to the state in 1904 was 76, a very gratifying record in comparison with that of previous years. The dia-

Diagram, No. 1, showing deaths in New Hampshire from typhoid fever, per 10,000 population, for 21 years, ending December 31, 1904.



gram herewith introduced gives a vivid illustration of the deaths from typhoid fever in this state from 1884 to 1904, inclusive, and shows also the percentage of deaths from this disease to each 1,000 of the population.

This reduction is undoubtedly due to the constantly improving sanitary conditions and particularly to the securing of better water supplies and the more careful protection of existing ones, disinfection, etc.

PERCENTAGES OF DEATHS BY AGE PERIODS.

The susceptibility of typhoid fever by age periods is graphically illustrated in Diagram No. 2. This presents the mortality from this disease to each 10,000 of the living population of the same age period. It will be seen that while no age is exempt from the disease, the most susceptible period is between the ages of 20 and 30. After 30 years of age, there is a decrease of liability of infection up to 70 years of age, when it again increases to the extreme limit of life.

This statement is based upon the careful analysis of 2,543 deaths that have occurred from this disease in New Hampshire from 1884 to 1904, inclusive.

Diagram, No. 2, showing mortality from typhoid fever to each 10,0&5 of the population of same age period, in New Hampshire, for 21 years.

ACTUAL DEATHS FROM TYPHOID FEVER.

The actual number of deaths that have occurred from typhoid fever during the past 21 years is correctly shown by age periods so far as ratios are concerned in Diagram No. 3. The figures are as follows: Between one and 10, 263; between 10 and 20, 569; between 20 and 30, 715; between 30 and 40, 323; between 40 and 50, 197; between 50 and 60, 144; between 60 and 70, 145; between 70 and 80, 116; over 80, 38; age not stated, 33.

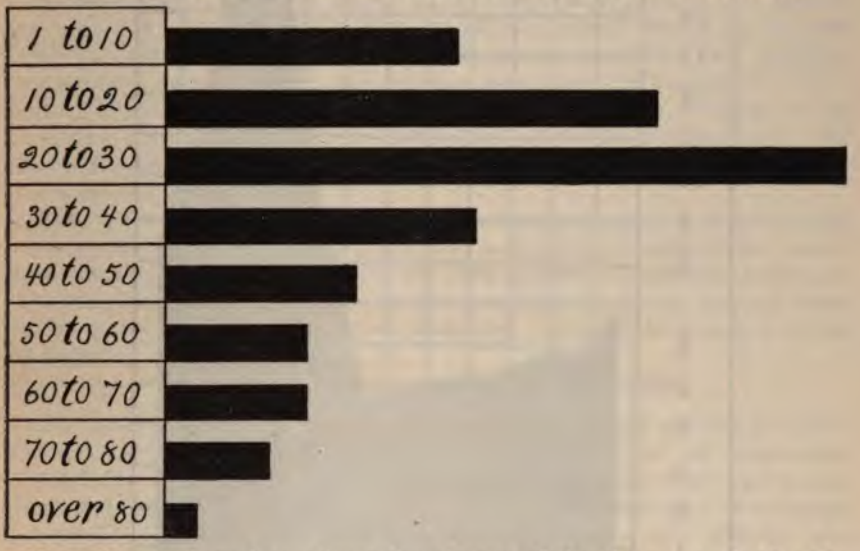
It will be seen that the great mortality from this disease is in men and women in the most productive period of life between the ages of 20 and 30,

representing a tremendous economic loss to the state, if considered from no other standpoint.

DEATHS FROM TYPHOID FEVER BY MONTHS.

Typhoid fever, although it exists at all seasons of the year, is more prevalent in the autumn months. Its greatest fatality is in September and October. The precentages of deaths by months are graphically illustrated in Diagram No. 4. The reason why typhoid fever should be more fatal in autumn than in any other period of the year is not well understood.

Diagram, No. 3, deaths from typhoid fever in New Hampshire, 1884–1904, by ages, showing ratios by age periods to total mortality from this disease.



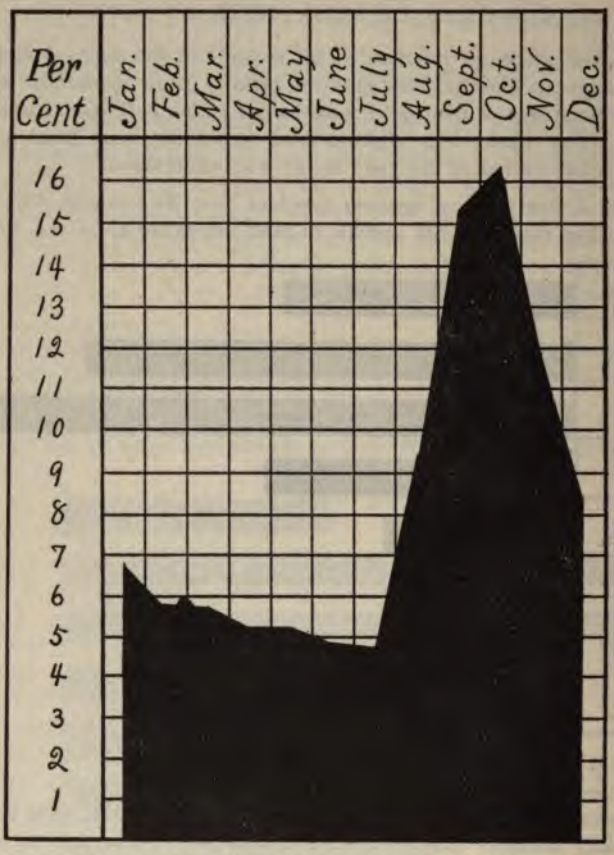
Many theories have been advanced and some of the older ones abandoned. It is generally thought that the summer heat and dryness is in some way responsible to a greater or less degree for the increased prevalence of this disease in autumn. It is probable that the cold weather following has a restrictive effect, so that upon its advent the disease rapidly diminishes.

THE CAUSE OF TYPHOID FEVER.

Typhoid fever is a germ disease—that is, it is produced by a micro-organism, known as the typhoid bacillus. The growth and development of this germ takes place within the body of the typhoid patient. It is always found in great abundance in the discharges of a person having typhoid fever, from the time of infection to weeks after convalescence is established.

This germ always maintains its specific character, and when it finds its way into the body of a person who is susceptible, the disease is developed in some form between that of a so-called walking case, slightly indisposed, to the most malignant, fatal type.

Diagram, No. 4, typhoid fever, percentage of deaths from, by months, 1884–1904, inclusive, representing 2,538 deaths.



Formerly it was believed that typhoid fever was developed from general bad sanitary conditions, but this view is no longer entertained, the fact being that the seed must be sown, or, in other words, the particular germ of the disease must be taken into the system before a true case of typhoid fever can be established, and this germ comes from some prior case. A further consideration of the subject will show the various ways in which this may happen.

HOW TYPHOID FEVER IS SPREAD.

The most frequent medium for the spread of typhoid fever is polluted water supply, and it is to this source that substantially all of the great epidemics of typhoid fever have been traced. From a like source, also, spring a great number of individual cases, frequently classed as "sporadic," the water being contaminated from sewers, house drains, privy vaults, and other sources through which the typhoid fever germ may be transmitted. A water sup-

ply, whether well, stream, reservoir, or pond, that is polluted with human excreta, solid or fluid, is a dangerous supply, because of the liability of typhoid infection at any moment. It is therefore highly essential that all water supplies, both private and public, should be guarded against pollution of this kind.

Another source of typhoid fever is an infected milk supply. Outbreaks of the disease have occasionally appeared from this cause. Milk infection may take place through the addition of polluted water, or by washing the cans and other utensils with such water, or by the carelessness of milkers or others who handle the milk, whose hands or clothing may be infected.

No milk should be distributed from a farm or dairy where there is a case of typhoid fever.

Personal contact has been shown by the commission appointed to investigate the spread of typhoid fever in the military camps during the Spanish War, to be a factor in the spread of this disease heretofore only partially recognized. In other words, the evidence shows that the disease was transmitted by persons not having the disease, infected bedding, clothing, eating and other utensils, and this to an extent that suggest the importance of most thorough disinfection of persons and things having any relation to a typhoid fever patient.

Flies are also carriers of contagion. Food may be infected through their agency. Oysters and other shell fish that come from sewage-polluted waters and eaten uncooked have transmitted this disease in numerous instances. Typhoid infection has undoubtedly been occasionally spread through vegetables grown upon infected soil and eaten raw. Infection from such a source is possible.

HOW TYPHOID GERMS ARE SCATTERED.

The media through which typhoid germs leave the body are the fecal discharges and the urine. The expectorations in some cases of pneumonia (typhoid-pneumonia, so called) also contain them. In all cases where complete and constant disinfection is not practised the organisms of this disease are often so disposed of as to endanger the water and milk supplies, and other food products.

The so-called sporadic cases (individual cases), that cannot be directly connected with a prior case, may readily be accounted for when the various ways in which the infection is distributed are understood.

An interval of 10 or 12 days takes place between the inception of the germ and the development of the characteristic symptoms, during which time the patient is daily excreting the germs of the disease in countless thousands. During this period of incubation the patient is unknowingly scattering the infection wherever he may be.

There are also mild cases in which the patient is under no restraint and travels about as usual. Such a case continues often for weeks, and, with no precautions taken, may cause a wide distribution of the germs of the disease.

A third way in which the poison of typhoid is extensively distributed is by patients who have so far recovered from the disease as to be able to travel about, or to assume their ordinary vocation, it having been demonstrated that the germ in many cases is present in the urine for weeks, and in some

cases for months, after convalescence is established. It will, therefore, be seen that the typhoid fever germ is doubtless very widely scattered, and when this fact is understood, it does not require a great stretch of the imagination to account for individual, or so-called sporadic cases.

These facts, thoroughly established by scientific investigations, emphasize the great importance of enforcing disinfection in the sick room constantly and to the minutest details and, further, of educating the patient that unless intelligent and effective precautions are taken he may be a source of danger to the community for some time after recovery.

The typhoid germ is nearly always taken into the system with food or drink, especially with water, and multiplies enormously in the intestinal canal. It is cast out of the body in the stools and in the urine, and probably by no other channel. This is of the utmost importance in considering measures to prevent the disease. As stated above, this germ, or plant organism, can live for some time after it leaves the body, just how long we do not know. In polluted soil, that is, earth containing much vegetable and animal matter undergoing decomposition, it may remain alive for several months and possibly longer. Many soils possess excellent filtering properties, and remove practically all germs from water passing through them. Other soils fail to filter out these germs. A well with a privy in close proximity is always more or less dangerous, and many outbreaks of typhoid fever have been traced to this condition. The germs of typhoid fever may get into the well at its top. In a hilly or rolling country it is not uncommon to find the privy on higher ground than the well. The privy often has no vault, the stools and urine being deposited on the surface of the ground. If the stools or urine of a typhoid patient are thrown into the privy, the first rain storm may wash the germs of the disease into the well. The roots of trees growing into a well may serve as conductors for contaminating substances. A leaky drain near the well may pollute it.

It is only since a few years that we have known that the germs of typhoid fever are often present in the urine of a person suffering from that disease. Formerly they were thought to be only in stools, so that while the stools were carefully disinfected, and possibly buried at a distance from the well, no attention was paid to the urine. The night vessel containing nothing but urine was often emptied near the well, where it was washed. *We must now consider that the urine, from its liquid character, is even more dangerous than the stools.*

CARE OF A CASE.

A typhoid fever patient should be placed in a large airy room without a carpet or unnecessary furnishings. If there is diarrhœa it is well to protect the bed with a rubber sheet placed under the linen sheet. The most scrupulous care should be taken of the discharges from the bowels and bladder. The stools or urine should be received in a vessel containing milk of lime, prepared by freshly slaking lime, using one part of the resulting powder or creamy liquid to four parts of water. Use a liberal quantity, and mix thoroughly by stirring with a stick. Fresh chloride of lime (it should smell strongly of chlorine) eight ounces to the gallon may be used instead, or car-

bolic acid, seven ounces to the gallon. The contents of the vessel may then be thrown into the water closet or buried far from any well or spring.

If the body linen or bed clothing should be soiled with the patient's discharges they should be at once removed and placed in the carbolic acid solution; or if the odor is objected to, in a solution of corrosive sublimate, a drachm to a gallon of water. After soaking an hour or more they may be laundered as usual. There is no disinfectant for clothing better than boiling water, and if soiled clothing can be promptly boiled this is the best treatment.

The nurse should be exceedingly careful about disinfecting her hands immediately after handling the patient. The carbolic acid or corrosive sublimate solution will be suitable for this purpose, or Labarraque's solution, one pint to a gallon of water, is efficient and pleasant. She should never eat or drink in the sick room. As spoons, dishes, etc., used in the sick room may become infected, it is well to disinfect these by boiling them in water for half an hour before they are used again.

The disinfection of stools, clothing, etc., should be kept up until the patient has fully recovered. When it is not necessary to strictly isolate the patient no needless visits to the sick room should be allowed.

In all outbreaks of typhoid fever of any considerable extent, there are, as a rule, many doubtful cases; persons who have fever for some days, and possibly bowel symptoms, but who are not confined to the house. These cases should be dealt with as typhoid fever and taken care of to secure efficient disinfection.[1]

Allow no flies to have access to sputum or discharges from the bowels and bladder, infected with typhoid fever.—The disease is liable to be spread by flies, which go from infected excreta to bread, cake, and other food to be eaten uncooked.

NOTIFICATION AND DUTIES OF BOARD OF HEALTH.

Every case of typhoid fever must be reported promptly to the local board of health. Physicians are required to render such reports, and a like responsibility upon some member of the household if no physician is in attendance. (Chapter 16, Laws of 1901.)

Upon receipt of such notice the local board of health should

1. Investigate the probable source and mode of origin of the disease. If probably from a contaminated well or general water-supply, see that measures are taken by stopping its use, by boiling it, or otherwise, to prevent further cases being caused in the same manner. If connected with the sewer, see that the plumbing is in good order and all fixtures properly trapped.

2. Order and enforce the disinfection of all discharges from the bowels of patients sick with typhoid fever. It is safest that the discharges of all persons who have diarrhœa shall be disinfected.[2]

3. Disinfect the contents of the privy on the premises, or any other that has been used by the patient.[3]

[1] From Ohio State Board of Health.

[2] For this purpose use milk of lime, or the chloride of lime solution.

[3] To keep a privy-vault disinfected during the progress of an epidemic, sprinkle chloride of lime freely over the surface of its contents daily, or use a quart of the chloride of lime solution daily.

4. Order and secure the disinfection of all articles of clothing or bedding that have been soiled by discharges from the patient.

5. Secure the coöperation of the people in the prevention of this disease by teaching them its modes of spreading, the best methods for its prevention, and the greater importance of efforts for its prevention in times of drought and low water in wells.[1]

6. See that the premises are properly disinfected after the death or recovery of the patient.

For a free and general use in privy vaults, sewers sink-drains, refuse heaps, stables, and wherever else the odor of the disinfectant is not objectionable, this is one of the cheapest and most effective disinfectants and germicides available for general use.

Chloride of lime ought to be obtained anywhere for ten cents a pound. In some places it can be obtained for five cents a pound.

This is one of the best disinfectants known.

QUARANTINE UNNECESSARY.

It is entirely unnecessary to quarantine a case of typhoid fever, or the premises in which it exists provided proper care is given to all the details of the sick room, as recommended.

The use of placards has been largely discontinued in this disease, and is not now required in this state.

If disinfection is practised as strictly as it should be, there is no danger of the disease's being communicated to others from a given case; but constant cleanliness and disinfection are absolutely necessary to secure such result.

DISINFECTANTS.

For daily use in connection with a case of typhoid fever there are no better disinfectants than chloride of lime, and the milk of lime, formulas for which are given below. The milk of lime has the decided advantage of not having an objectionable odor.

At the proper time, general disinfection of the sick room should be carried out by the local board of health, using the formaldehyde process already recommended for this purpose.

CHLORIDE OF LIME SOLUTION.

Chloride of lime (bleaching powder), one pound; water, three gallons. Mix. Cost, about three cents per gallon.

Care should be taken to obtain *fresh* chloride of lime.

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[1] Wells are more dangerous at times of low water, because the area of drainage to the well is greatest when the water is lowest.

It may also be used for washing the hands or other parts of the body which may have been exposed to infection from excreta, etc.

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Quicklime is one of the cheapest disinfectants. This solution can take the place of chloride of lime, if desired. It should be used freely, in quantity equal in amount to the material to be disinfected. It can be used to whitewash exposed surfaces, to disinfect excreta in the sick-room or on the surface of the ground, in sinks, drains, stagnant pools, etc.

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A SAND FILTER FOR THE HOME.

A SAND FILTER FOR THE HOME.

ROBERT FLETCHER, PH. D., CIV. ENG.
Member of the N. H. State Board of Health.

The American people have been very careless concerning the purity of their water supplies. Even the great cities and many intelligent and progressive communities have been slow to follow the example of European cities. London, the greatest aggregation of communities in the world, has been supplied with water filtered through sand since 1829. It has been remarked that "England has secured a series of magnificent supplies by impounding the waters of small streams in reservoirs holding enough water to last through dry seasons. Germany has spent millions in purifying turbid and polluted river waters, while France and Austria have striven for mountain spring waters and have built hundreds of miles of costly aqueducts to secure them. One can travel through England, Belgium, Holland, Germany and large portions of other European countries and drink the water at every city visited, without anxiety as to its effect upon his health. In the United States an abundant supply of some liquid has been too often the objective point and the efforts have been most successful, the American works being unrivalled in the volumes of their supplies. I do not wish to imply that quality has been entirely neglected in our country, for many cities and towns have seriously and successfully studied their problems, with the result that there are hundreds of water-supplies in the United States which will compare favorably upon any basis with water-supplies in any part of the world; but on the other hand there are hundreds of other cities, including some of the largest in the country, which supply their citizens with turbid and unhealthy waters which cannot be regarded as anything else than a national disgrace and a menace to our prosperity.[1]

The efficacy of sand filtration was recognized more than a generation before a beginning had been made in the modern science of bacteriology, or any biological explanation suspected. But the pure waters of natural springs and deep wells had furnished object lessons, in all ages and in all lands, which should have prompted men everywhere to imitate a process of nature so simple.

Concerning the method and now well-understood theory or explanation of the process we may conveniently quote from a well-known authority.[2]

"Filtration of water consists in passing it through some substance which retains or removes some of its impurities. In its simplest form filtration is a training process, and the results obtained depend upon the fineness of

[1] Allen Hazen in "Filtration of Public Water Supplies," pp. 1 and 2 (1900).
[2] Allen Hazen, in the treatise before quoted.

the strainer, and this is regulated by the character of the water and the uses to which it is to be put. Thus in the manufacture of paper an enormous volume of water is required free from particles which, if they should become imbedded in the paper, would injure its appearance or texture. Obviously for this purpose the removal of the smaller particles separately invisible to the unaided eye would be a simple waste of money. When, however, a water is to be used for a domestic water supply and transparency is an object, the still finer particles which would not show themselves in paper, but which are still able, in bulk, to render a water turbid, should be, as far as possible, removed, thus necessitating a finer filter; and when there is reason to think that the water contains the germs of disease, the filter must be fine enough to remove with certainty those organisms so extraordinarily small that millions of them may exist in a glass of water without imparting a visible turbidity."

For filtration of water on a large scale the body of the filter is composed of rather fine sand disposed in horizontal layers, supported by gravel and underdrained, the whole being enclosed in a suitable basin or walled tank. A brief statement of the theoretical and practical aspects of the process may be stated in the words of the same authority:

"The water in passing through the sand leaves behind upon the sand grains the extremely small particles which were too fine to settle out in the settling-basin, and is quite clear as it goes from the gravel to the drains and the pumps, which forward it to the reservoir or city.

"The passages between the grains of sand through which the water must pass are extremely small. If the sand drains were spherical and 1-50 of an inch in diameter, the openings would only allow the passage of other spheres 1-320 of an inch in diameter, and with actual irregular sands much finer particles are held back. As a result the coarser matters in the water are retained on the surface of the sand, where they quickly form a layer of sediment, which itself becomes a filter much finer than the sand alone, and which is capable of holding back under suitable conditions even the bacteria of the passing water. The water which passes before this takes place may be less perfectly filtered but, even then, the filter may be so operated that nearly all of the bacteria will be deposited in the sand and not allowed to pass through into the effluent.

"As the sediment layer increases in thickness with continued filtration, increased pressure is required to drive the desired volume of water through its pores, which are ever becoming smaller and reduced in number. When the required quantity of water will no longer pass with the maximum pressure allowed, it is necessary to remove, by scraping, the sediment layer, which should not be more than an inch deep. This layer contains most of the sediment, and the remaining sand will then act almost as new sand would do. The sand removed may be washed for use again, and eventually replaced when the sand layer becomes too thin by repeated scrapings."

We may add, as to the bacterial action, that certain bacteria—so minute that about twenty-five thousand of them might be packed together in the space of an inch,—rapidly multiply in the interstices of the sand and form a film or slime which fills the spaces where the other bacteria which cause disease are intercepted and destroyed. These so-called pathogenic, or dis-

ease-causing, organisms have generally less vitality than the nitrifying and other bacteria which have a beneficent action in the sand spaces, more especially in the upper layers. All this action requires a certain time, so that the proper rate of filtration on a large scale has been found by long experience to be less than two million gallons per acre per day; equivalent to about forty-five gallons per square foot per day, through four to five feet depth of sand.

VARIOUS FILTERING CONTRIVANCES.

In this connection we may mention some of the various devices, more or less familiar, which have had world-wide use for household service: 1. A brick partition wall in a well or cistern, through which all the water must pass to reach the pump-suction, is an excellent *strainer* and probably has considerable bacterial efficiency; but the occasional cleaning (scrubbing) which it should have is an unpleasant operation under awkward conditions. 2. A mass or plate of fine charcoal between metal (copper) screens is a very effective strainer while fresh, and (if thick enough) should serve well as a bacterial filter during a considerable period; but the charcoal must be renewed at more or less frequent intervals depending upon the size of the filter and the quantity of water passing through. 3. The little strainers, extensively sold in the hardware trade, made to screw on to the faucet, and said to be cleansed and renewed daily by simply reversing and allowing the water under service-pressure to drive out the collected impurities,—these are nothing but crude strainers which clog rapidly if the water carries much solid impurity. Evidently they have practically no bacterial efficiency because the water passes immediately through them and all proper conditions for bacterial action are lacking. 4. The Pasteur-Chamberland and Berkefeld filters have been considerably used as domestic filters. The materials are respectively baked biscuit porcelain or baked infusorial earth; the construction is "scientific" in details, requiring considerable mechanical skill; the size and shape are adapted to direct attachment to the service pipe. The bacterial efficiency of these has been carefully tested in Germany and found to be generally, but not uniformly, good. They require careful cleansing in hot water at frequent intervals and are quite expensive in proportion to their capacity. 5. Stone filters and asbestos filters have been found to be quite unreliable. Various patented "filters" have been offered to the American public, but they are usually expensive and complicated by contrivances for alleged automatic action. Some of these may be meritorious and more or less effective, but not readily procurable by the average householder.

THE SAND (BACTERIAL) FILTER ADAPTED TO HOUSEHOLD REQUIREMENTS.

The writer has had in successful operation during the past 11 years a series of small sand filters made and operated according to the principles governing the action of large sand filters of city water supplies. During periods when the reservoir-water supplied to the town was turbid or distinctly obnoxious to taste or smell—from presence of algae or other organisms therein—the same water passing through these filters was perfectly palatable, without taste or smell and nearly free from color. In the earlier experiments the filter cases were made of galvanized iron, but the interior

of these became rusty after a few years, and the rust finally caused leaks, The form to be described has an imperishable encasement and possesses the following advantages: All the parts and material are easily procured, comparatively inexpensive, will not rust or decay, and will remain clean. The operation is as simple as possible, without valves or mechanism, or use of any patented devices. The filter will continue in use indefinitely, without renewal of parts, and with far less care and attention than is required by any other apparatus of the household economy. It can be made by any man who has acquired ordinary facility in doing small jobs about his house, or by competent hired help in a few hours. For the writer a handy man, having the materials all ready, has repeatedly set up such a filter in three hours. The parts in detail or the combination as a whole are not patentable.

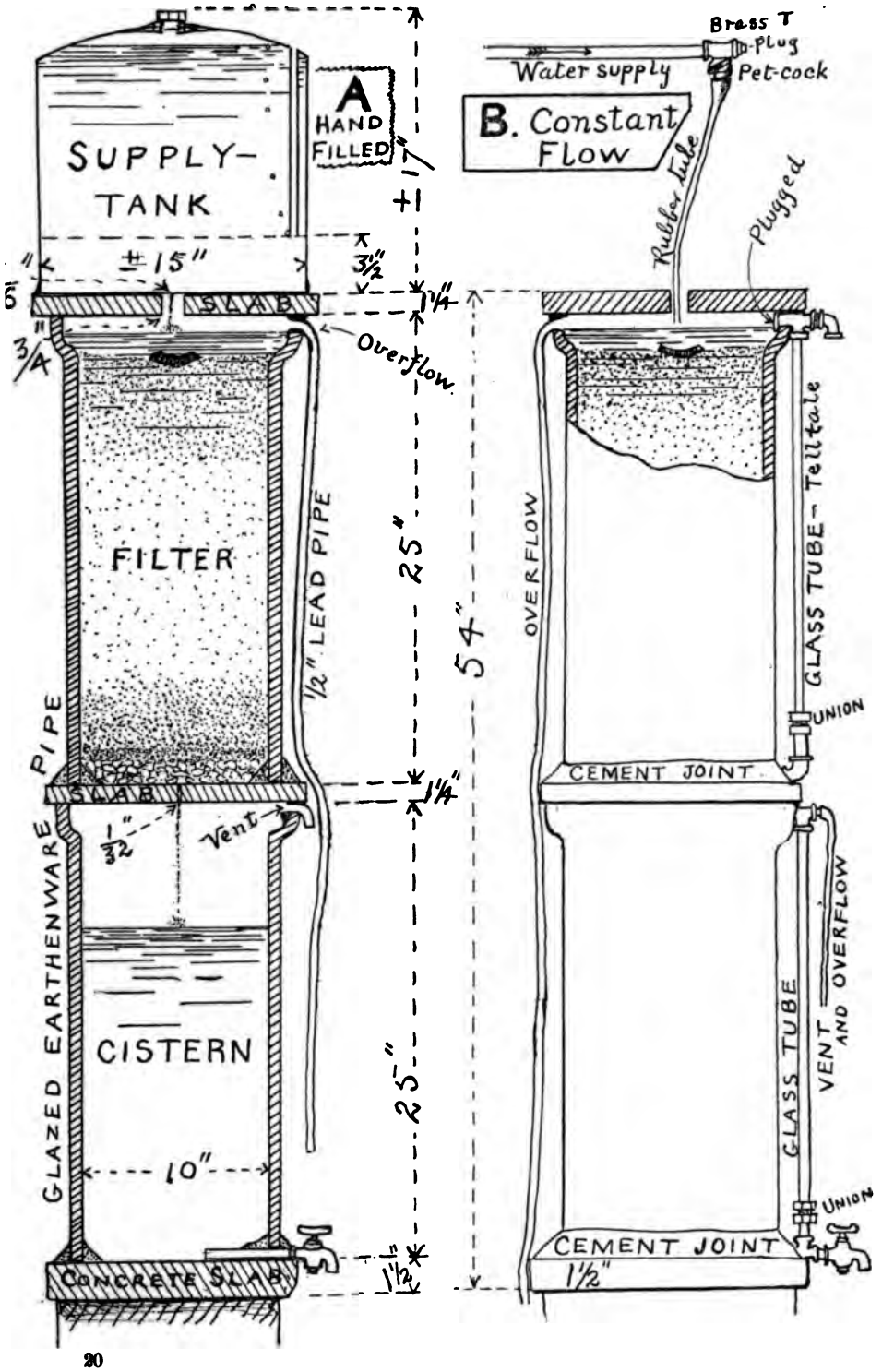
The drawing shows two styles, A and B. Style A is intended for service when the water supply is handled by pail from a well, cistern or running stream. The filter must then be fed from a superimposed tank, which must be filled by hand as often as required. Style B is adapted to situations where the water is supplied through an aqueduct pipe, so that the filter may be fed through a regulating valve and short length of small pipe.

HOW TO MAKE THE FILTER.

Provide a suitable solid and strong support, impervious to water, near a sink or drain pipe, so that there will be convenient escape for the overflow. The weight to be supported is about 375 pounds for style B and 450 pounds for style A (see the drawing). There should be about seven feet height of clear space above the support for style A and five to five and a half feet for style B. If it is not easy to get a slab of slate or soapstone, or to make a base of brick (with a cement coat) and mortar, a slab of mortar or cement and sand may be made as follows:

1. Make a circular mould or form about sixteen inches in diameter, by bending a piece of sheet iron (two inches wide), or a piece of barrel hoop, into a circular shape. Place this on some flat, smooth surface, as a floor or bench (preferably on a sheet of metal, which will not absorb water); take about seven quarts of clean sand or fine stuff from a stone-crusher and about four quarts of good Portland cement and *mix thoroughly* in dry state; then gradually add water and work with a mason's trowel (a garden trowel will serve tolerably well) to a consistency of fairly stiff mortar; fill by degrees into the mould and gently tamp with a stick while filling, until the form is full and water stands on the upper surface, after smoothing with the trowel. The gradual filling and tamping are necessary to exclude air bubbles and make a dense water-tight slab. Let this stand about two days—until hard enough to handle.

2. At the same time and in a similar manner make the intermediate slab and the upper or covering slab shown in the drawing, with the following differences; thickness need be only about one and a quarter inches; in the center of the intermediate slab a hole must be left 1-32 of an inch in diameter, to make which insert a wire, No. 21 Birmingham wire gauge, and remove within a few hours, before the cement is set hard around it. (Draw it *upwards* gently with a twisting motion so as not to enlarge the hole on the *under* side and yet leaving the passage a trifle larger on the upper side of


A
HAND FILLED
SUPPLY-TANK
± 15"
17" ±
3½"
SLAB
1¼"
Overflow
FILTER
½" LEAD PIPE
25"
PIPE
SLAB
1¼"
1/32"
Vent
CISTERN
GLAZED EARTHENWARE
10"
25"
CONCRETE SLAB
1½"
54"
B. Constant Flow
Water supply
Brass T
Plug
Pet-cock
Rubber tube
Plugged
OVERFLOW
GLASS TUBE - Telltale
UNION
CEMENT JOINT
GLASS TUBE
VENT AND OVERFLOW
UNION
CEMENT JOINT
1½"

the slab and with a smooth interior.) In the upper slab make a hole about three quarters of an inch in diameter by placing a wooden plug in the center during the moulding process.

3. *To place the lower section which serves as a cistern.*—Having at hand the piece of half-inch brass pipe for the outlet tightly screwed into the faucet, roughen the surface of the pipe by nicking with a file or cold chisel; prepare enough cement mortar like that used for slabs; lay a ring of it (11 inches in diameter), about half an inch thick and four inches wide, on the support; press into this the brass pipe so that the faucet shall project well forward, and then set the small end of the big pipe section (clean and damp) into the fresh mortar ring; (a small half-round notch must have been previously chipped out of the edge of the glazed pipe to roughly fit over the brass pipe); then, immediately, with a trowel—a mason's pointing trowel is best—work the mortar with firm pressure up against the earthenware, inside and outside, so as to make a dense water-tight joint. (Another notch should already have been made at the proper point in the bell end of the glazed pipe to serve for the vent and overflow.) All of this description might be inferred from the drawing.

4. *The filter section.*—Before putting this up, the work already done should be allowed to stand over night, so that the mortar may set hard. To note briefly what the drawing clearly shows: Place the *intermediate* slab (with the small hole) over the lower section. On this set the upper pipe section into a mortar ring and work the mortar as before with pressure, so as to make the joint quite water tight all around. Be careful not to jar or loosen the lower section and its joint, so as to require doing the job again.

5. *Placing the filtering material.*—Carefully put into the bottom a layer of *clean* gravel-stones, or pieces of crushed rock about one-half inch in diameter, to a depth of about one and a quarter inches; above this a layer of smaller gravel about pea-size to the depth of three quarters of an inch more; then a half-inch layer about the size of shot; then an inch layer of *coarse sand*, from which all the fine dust must have been screened. We thus have a graded drainage stratum about three and a half inches deep. The necessity of this careful grading is to prevent small particles from the body of the filter working down to clog the outlet. The filter proper is a mass of rather fine sand, as uniform in size as can be found, well washed by stirring in a pail and pouring off the dirty water, and evenly placed in horizontal layers, up to the enlargement at the bell end. It is well to put in some excess to allow for settlement, so that the final surface shall be about an inch below the overflow. The latter may be of one-half inch lead pipe, carefully cemented into a notch chipped out of the edge of the bell, and extended to any convenient place where the drip may run away. In the center of the sand surface place a piece of brick or slate or broken earthenware about three inches square, to check the impact of the incoming stream and prevent disturbance of the surface of the sand.

VARIOUS ARRANGEMENTS OF THIS DEVICE.

a. If the householder already has a convenient cistern, *clean beyond suspicion*, the lower part or receptacle of filtered water may be omitted and proper means used to convey the effluent from the filter to his cistern. If he

also has water served from a pipe, we have the simplest case of all, where the essential parts are only the filter with its cover, a piece of small pipe or tubing to deliver the water, a small valve or pet-cock to regulate the flow, and the overflow pipe.

b. If the water to be filtered comes from a well or brook, the supply tank is needed, as shown in the drawing marked A. This is constructed so as to deliver the water "under a constant head," that is, at a uniform rate—which is an essential condition of operation of the filter. The principle of action is that of the well-known "Mariotte's bottle," described in works on experimental physics. The vessel should be made of sheet copper, or tinned copper if preferred, with a top slightly rounded for strength, and a cap or stopper at the center to be screwed in so as to be air-tight. Near the side a small tube 1-4 inch or 3-8 inch in diameter is fastened to the top with an air-tight joint, and extends to within three and a half inches of the bottom. This distance must be as exact as possible, as it is the actual head which determines the rate of discharge. A small hole, one-sixteenth of an inch in diameter, must be smoothly drilled at the center of the bottom. To start the operation place the tank centrally with its discharge opening over the center of the cover slab. Remove the stopper and fill the tank and immediately replace the stopper, screwing it down air-tight. The atmospheric pressure, acting through the small tube, will maintain the pressure constant, until the water surface falls to the lower end of the tube—when the tank should be refilled. Air will enter through the tube with a slight gurgle, to replace the water discharged.

With dimensions here shown probably a little more than thirty gallons per day (24 hours) will flow through the filter and about forty gallons from the supply tank, which allows for a waste or overflow sufficient to keep the filter full. The supply tank shown would contain more than ten gallons above the lower end of the inlet tube.

c. If it is deemed desirable to have a "telltale" to show the level of the water in the cistern, and also to indicate when the filter is becoming clogged, the extra fittings needed and their arrangement are plainly shown in the drawing marked B. In this case care must be taken to get the fittings in proper line so as to hold the glass tubing without strain; also to cement the small T's into the notches in the earthenware with water-tight joints. Note that the upper T must be closed by a proper brass plug to exclude unfiltered water from the tube.

d. Twelve-inch earthenware pipe would give a capacity more than 40 per cent. greater, but would require two persons to handle the lengths. Thirty gallons per day of water used strictly for drinking and cooking would suffice for an ordinary family. The three-foot lengths of earthenware pipe would give greater storage capacity and greater depth of sand in the filter, but would require an awkwardly long reach in the building of the apparatus.

NECESSARY CARE AND ATTENTION.

Although the filter thus described requires comparatively little care, yet a domestic utility so important as this *must be attended to as required.*

If arrangement B is used, and there is no telltale, the drip from the overflow will indicate a *full filter* and the sound of the drip into the cistern will

give an idea of whether that is more or less full. Clogging of the filter will be manifest when the drip becomes excessive and the supply of filtered water becomes scant. With a telltale it is needless to say that the degree of clogging is indicated by the distance of the top of the water column in the tube below the level of the water surface in the filter.

To renew the action of the filter when too much clogged, scrape off the sand and deposit at the top to a depth of about one half inch or more, as may appear needful. Replace this by as much clean sand, or by that which was removed, after carefully washing it. With ordinary water, not noticeably turbid, such scraping may only be needed at intervals of ten or twenty weeks; but more frequent treatment must be given under less favorable conditions.

If arrangement A is used, besides the same amount of care just described, there must be the supplying of water to the feeding tank, which, for dimensions here given would be about three or four times daily, including a filling just at night time.

Filling.—Properly, to start such a filter it should be filled from below with water already filtered. But in the ordinary household it would not usually be practicable to accomplish such conformity to theoretical requirements. Hence no provision is made for such a filling, excepting the arrangement in style B with the telltale tube, where, by turning up the bend and screwing in a length of pipe, water may be run in at the bottom through the glass pipe, and so the air will be forced upward through the sand.

Ordinarily the full bacterial efficiency only comes in any case some days after starting, and any clear water free from suspicion may be used. If contamination of the water is suspected, then all that is used for the first filling should be boiled and put in from a clean vessel. Also the rate of admission is so gradual and as the small stream falls centrally, there is good reason to believe that the occluded air will readily escape either through the lower opening or near the walls of the filter case.

When the feed tank is used, evidently any omission to keep it in proper action,—allowing it to empty itself,—will result in irregular action of the filter; that is, a total or partial emptying of the filter and an objectionable frequency of refilling. Constant flow should be maintained if possible, at least during daytime.

COST.

Style B, without telltale fixture:

Two lengths of 10-inch earthenware pipe	$1.32
Faucet, half-inch, brass	.75
Brass tubing	.15
Lead pipe, half-inch, four feet and two feet	.60
Pet-cock, brass	.15
One half-inch elbow	.12
	$3.09
Thirty-five pounds Portland cement and sand to suit	.41
	$3.50
Labor, if hired, say	2.50
Style B (simple)	$6.00

For style A, add for copper tank	$4.50
Style A (simple)	$10.50

For first case with other fitings (brass):	
Two glass tubes	$0.30
Two unions, half-inch	.50
Three T's, half-inch	.50
Two bends	0.25
Extra length of half-inch tube	.15
Extra, say	$1.70
Brought down	6.00
Style B, with all extras	$7.70

Style A with all the extra fittings, $10.50+$1.75	$12.25

Of course such a statement is only approximate. The cost of materials and skilled labor will vary somewhat with the locality, but the above may be considered a fair average. Nickel-plated fittings may be preferred.

DURABILITY.

As before stated, all the materials here used are not subject to deterioration in this combination. If the upper layer (three to four inches) of the sand is renewed as the case requires, the action of the filter should continue indefinitely. The writer has had such a filter in use for several years with no apparent loss of efficiency. This statement needs qualification because of the fact that tests of bacterial efficiency have not been numerous or systematic. But usual water analyses at the State Laboratory of Hygiene have invariably shown that the quality of the water was of the best.

CONCLUSION.

The foregoing contrivance is presented to the public, through the New Hampshire State Board of Health, in the hope and belief that it answers the question which many find so perplexing,—how to secure, at moderate cost and by simple apparatus, a pure drinking water from sources which are dangerous or suspected. The principle of its action has been proved and approved by tests and experiments continued through many years,—in many countries; and in the form here described it has been in successful use by the writer more than a decade. But let the reader beware not to leave the construction or operation of such a utility to the ignorant incompetence or willful indifference and neglect of untrustworthy "help." It demands intelligent supervision and the occasional attention prompted by a proper understanding of what it is and what it ought to do from day to day.

LOCAL BOARDS OF HEALTH.

LOCAL BOARDS OF HEALTH.

Town.	Name.	P. O. Address.	Date of Appointment.
Acworth.	Dr. B. T. Mousley, Sec.	Acworth,	July 1, 1905.
	Edgar K. Morrison,	South Acworth,	Aug. 4, 1906.
	George W. Buss,	East Acworth,	Aug. 4, 1906.
Albany.	Ichabod Hammond, Sec.,	Iona,	Dec. 8, 1906.
	Mark M. Knox,	Iona,	Dec. 8, 1906.
	Frank O. Hammond,	Conway,	Dec. 8, 1906.
Alexandria.	H. F. Tilton,	Bristol, R. F. D. No. 1,	March 13, 1906.
	A. F. Cheney, Sec.,	Bristol, R. F. D. No. 1,	March 13, 1906.
	Walter Ferren,	Bristol, R. F. D. No. 1,	March 13, 1906.
Allenstown.	John F. Bartlett,	Suncook,	March 14, 1905.
	Chas. P. Emery,	Suncook,	March 14, 1905.
	Dr. A. M. Lavallee, Sec.	Suncook,	March 13, 1906.
Alstead.	Dr. R. F. Oliver, Sec.	Alstead,	May 12, 1906.
	S. A. Mitchell,	Alstead,	May 12, 1906.
	Geo. A. Mayo,	East Alstead,	May 12, 1906.
Alton.	Charles E. Fifield,	Alton,	March 31, 1905.
	Charles E. Hutchins,	Alton,	March 31, 1905.
	Frank M. Ayer, Sec.,	Alton,	April 27, 1906.
Amherst.	Arthur C. Decatur,	Amherst,	May 4, 1901.
	Dr. Frederick Chandler,	Amherst,	April 21, 1902.
	Frank C. Taylor,	Amherst,	April 21, 1903.
Andover.	Charles W. Stone,	East Andover,	June 18, 1901.
	Wilton P. Graves,	East Andover,	April 26, 1902.
	Dr. Henry A. Weymouth,	Andover,	April 25, 1903.
Antrim.	Oscar W. Brownell,	Antrim,	April 22, 1905.
	Samuel S. Sawyer,	Antrim,	Sept. 7, 1905.
	Dr. F. G. Warner, Sec.,	Antrim,	April 23, 1906.
Ashland.	E. P. Warner,	Ashland,	March 22, 1904.
	Dr. J. M. Cheney,	Ashland,	April 25, 1905.
	O. A. Brown, Sec.,	Ashland,	May 8, 1905.
Atkinson.	Franklyn I. Knight,	Atkinson,	March 16, 1904.
	Samuel B. Mason,	Atkinson,	June 19, 1905.
	George P. Dow, Sec.,	Atkinson,	March 22, 1906.
Auburn.	Edgar L. Preston, Sec.,	Auburn,	May 1, 1904.
	Albert E. Preston,	Auburn,	April 19, 1905.
	John P. Griffin,	Auburn,	May 8, 1906.
Barnstead.	Enos George,	Barnstead,	Oct. 1, 1904.
	B. Frank Dow,	North Barnstead,	May 5, 1905.
	John D. Nutter, Sec.,	Center Barnstead,	April 24, 1906.
Barrington.	A. B. Locke,	Barrington,	May 11, 1904.
	E. K. Maynard,	East Barrington,	May 11, 1904.
	L. B. Bradford,	East Barrington,	May, 1906.
Bartlett.	M. W. Pierce,	Glen,	April 15, 1901.
	Edgar Stevens,	Bartlett,	April 7, 1902.
	Dr. B. L. Richardson,	Bartlett,	June 29, 1904.
Bath.	Albert H. Clough,	Bath,	April 20, 1904.
	Dr. John B. Warden, Sec.,	Bath,	April 19, 1905.
	Samuel M. Chamberlin,	Woodsville,	April 19, 1906.
Bedford.	Lyman M. Kinson,	Bedford,	June 15, 1905.
	Charles P. Woodbury, Sec.,	Bedford,	March 18, 1904.
	Orra G. Kilton,	Manchester, R. F. D. No. 7,	April 26, 1906.

Belmont.	Clarence W. Johnson, Sec.,	Belmont,	Dec. 6, 1904.
	W. H. H. Chaplain,	Belmont,	Sept. 10, 1906.
Bennington.	H. J. Burtt,	Bennington,	March 15, 1904.
	Allen Gerard,	Bennington,	May 10, 1905.
	A. F. Bell,	Bennington,	March 24, 1906.
Benton.	Orman L. Mann, Sec.,	Benton,	Nov. 16, 1906.
	George F. Clark,	Benton,	Nov. 16, 1906.
	Solomon J. Hutchins,	Benton,	Nov. 16, 1906.
Berlin.	Dr. A. Provost, Chairman,	Berlin,	March 26, 1906.
	George E. Bouthet,	Berlin,	March 26, 1906.
	Joseph J. Roberge,	Berlin Mills,	March 26, 1900.
Bethlehem.	Willard H. Presby, Sec.,	Bethlehem,	April 9, 1906.
	Dr. Harry S. Pratt,	Bethlehem,	March 29, 1905.
	Dr. Henry A. Hildreth,	Bethlehem,	April 15, 1904.
Boscawen.	Dr. Eli E. Graves, Sec.,	Penacook,	May 22, 1905.
	Dr. A. C. Alexander,	Penacook,	April 2, 1906.
	W. G. Buxton,	Penacook,	Sept. 28, 1906.
Bow.	Hazen Saltmarsh,	Concord, R. F. D. No. 3,	April 21, 1904.
	Herbert C. Colby,	Hooksett, R. F. D. No. 1,	April 16, 1906.
	George W. Short,	Hooksett, R. F. D. No. 1,	March 20, 1906.
Bradford.	Charles Gillis, Sec.,	Bradford,	April 27, 1903.
	Dr. D. G. Underwood,	Bradford,	April 25, 1905.
	Dr. Nathan L. Griffin,	New London,	April 25, 1905.
Brentwood.	Dr. Ezra B. Pike,	Exeter, R. F. D. No. 1,	April 16, 1906.
	Thomas H. Philbrook,	Epping, R. F. D. No. 1,	April 16, 1906.
	James L. Stevens,	Exeter, R. F. D. No. 1,	April 16, 1906.
Bridgewater.	Herman H. Haney,	Plymouth, R. F. D.,	April 26, 1904.
	J. H. Morrison, Sec.,	Plymouth, R. F. D.,	April 3, 1905.
	H. O. Pike,	Bridgewater,	Sept. 12, 1906.
Bristol.	Davis M. Calley,	Bristol,	April, 1904.
	Charles W. Fling, Sec.,	Bristol,	April, 1905.
	Clarence A. Smith,	Bristol,	April, 1906.
Brookfield.	J. F. Robinson, Chairman,	Brookfield,	April 1, 1904.
	Charles Willey, Sec.,	Sanbornville, R. F. D.,	April 15, 1903.
	Jasper T. Palmer,	Sanbornville, R. F. D.,	May 13, 1905.
Brookline.	Dr. Charles H. Holcombe,	Brookline,	March 9, 1904.
	Charles S. Dunbar,	Brookline,	March 18, 1905.
	Charles H. Russell,	Brookline,	March 17, 1906.
Campton.	S. P. Robie	Campton Village,	April 15, 1905.
	Heber K. Smith,	Plymouth, R. F. D.,	April 15, 1905.
	Dr. H. A. Cheney, Sec.,	Campton Village,	April 29, 1903.
Canaan.	Wallace G. Fogg,	West Canaan,	May 7, 1904.
	George W. Chase, Sec.,	Canaan Center,	April 21, 1905.
	Frank B. Clark,	Canaan,	March 24, 1906.
Candia.	J. Lane Fitts,	Manchester, R. F. D. No. 1,	May 16, 1905.
	Edwin J. Godfrey,	Candia Village,	May 1, 1906.
	Avery M. Foster, Sec.,	Candia, R. F. D. No. 1,	April, 1901.
Canterbury.	Albert F. Drew, Sec.,	Canterbury,	March 12, 1904.
	James Frame,	Canterbury,	March 25, 1905.
Carroll.	John H. Glines,	Twin Mountain,	April 21, 1900.
	Richard J. Quinn, Sec.,	Twin Mountain,	April 17, 1901.
	Stephen F. Gallagher,	Fabyan House,	April 2, 1902.
Center Harbor.	Dr. L. B. Morrill, Sec.,	Center Harbor,	May 16, 1906.
	Frank R. Gammon,	Center Harbor,	May 16, 1906.
	George S. McCrillis,	Meredith,	May 15, 1906.
Charlestown.	Dr. Oscar C. Young, Sec.,	Charlestown,	March 31, 1906.
	W. A. Hunt,	North Charlestown,	March 31, 1906.
Chatham.	Charles Binford,	Chatham Center,	April, 1904.
	Alvin Head,	South Chatham,	April 27, 1904.
	Madison O. Charles,	North Chatham,	April 27, 1904.

Chester.	Cyrus F. Marston, Sec.,	Chester,	April 27, 1904.
	Robert H. Hazelton,	Chester,	April 10, 1905.
	Walter I. Martin,	Chester,	April 14, 1906.
Chesterfield.	Anzlo M. Spring, Sec.,	West Chesterfield,	April 26, 1904.
	John W. York,	Spofford,	March 18, 1905.
	Wallace K. Ware,	Chesterfield,	March 28, 1906.
Chichester.	Albert Thompson,	Chichester,	April 13, 1905.
	J. L. T. Shaw, Sec.,	Chichester,	April 13, 1905.
Claremont.	Dr. A. L. Marden, Sec.,	Claremont,	April 1, 1904.
	George A. Rowell,	Claremont,	March 31, 1905.
	Rufus L. Howe,	Claremont,	March 31, 1906.
Clarksville.	Moses Hardy,	Clarksville,	March 9, 1905.
	Noah F. Kidder,	Colebrook, R. F. D.,	March 13, 1906.
	Charles Knights,	Pittsburg,	March 13, 1906.
Colebrook.	Dr. Edwin A. Cook,	Colebrook,	April 28, 1906.
	D. S. Pease,	Colebrook,	April 28, 1906.
	Dr. E. E. Twombly,	Colebrook,	April 28, 1906.
Columbia.	William E. Cone, Sec.,	Columbia,	May 16, 1906.
	Chas. E. Martin.	Colebrook,	May 19, 1906.
	Fred A. Keeble,	Columbia,	May 19, 1906.
Concord.	Dr. Chancey Adams, Sec.,	Concord,	March 9, 1903.
	George A. Berry,	Concord,	March 14, 1904.
	Dr. Russell Wilkins,	Concord,	March 13, 1905.
	Chas, E. Palmer, Health Officer, Concord, elected by city government.		
Conway.	Dr. George H. Shedd,	North Conway,	1904.
	Dr. B. F. Horne,	Conway,	1905.
	W. R. Burnell, Sec.,	Conway Center,	1906.
Cornish.	Joseph S. Chase,	Cornish Flat,	June 12, 1906.
	George E Fairbanks,	South Cornish,	March 10, 1905.
	George L. Deming,	Windsor, Vt.,	Sept. 5, 1906.
Croydon.	S. W. Gilman,	Croydon,	April 28, 1904.
	F. W. Putnam, Sec.,	Croydon,	May 30, 1905.
	C. H. Forehand,	Croydon,	April 26, 1906.
Dalton.	W. B. Aldrich,	Whitefield, R. F. D. No. 2,	March 9, 1905.
	E. R. Wallace,	Whitefield, R. F. D. No. 2,	March 29, 1905.
	Zenas Dexter,	Whitefield, R. F. D. No. 2,	June 30, 1905.
Danbury.	Arthur R. Ford,	Danbury,	June 25, 1904.
	Dr. Lee V. Knapp,	Danbury,	April 17, 1906.
	Willis W. Walker,	Danbury,	July 2, 1906.
Danville.	Eugene F. Kimball,	North Danville,	April 27, 1904.
	Elmer A. Kimball,	South Danville,	March 13, 1906.
	Freeman W. Tuck,	North Danville,	March 13, 1906.
Deerfield.	Dr. G. H. Towle,	Deerfield,	April 17, 1906.
	E. T. Chase, Sec.,	Gossville, R. F. D No. 1,	April 22, 1905.
	J. H. Prescott,	Deerfield Center,	April 17, 1906.
Deering.	Charles E. Brown, Sec.,	Deering,	April 29, 1905.
	William F. Whitaker,	East Deering,	April 29, 1905.
Derry.	Dr. Walter R. Sanders,	Derry,	March 22, 1905.
	William F. Eaton,	West Derry,	March 31, 1906.
	Edward M. Lynch,	West Derry,	April 7, 1904.
Dorchester.	Clarence P. Waldron,	Cheever,	March 23, 1906.
	Azro H. Schoolcraft, Sec.,	Cheever,	March 15, 1905.
	Hazen H. Clough,	North Dorchester,	March 11, 1904.
Dover.	Dr. E. G. Batchelder, City Physician,	Dover (*ex officio*),	January, 1906.
	E. C. McCone, City Marshal,	Dover, App. by Police Com. (*ex officio*).	
	Charles M. Jones, Executive Officer,	Dover,	February, 1905.

Dublin.	Willard H. Pierce,	Dublin,	March 8, 1904.
	Clesson E. Gowing,	Dublin,	March 3, 1905.
	Clifford Gowing,	Dublin,	March 19, 1906.
Dummer.	A. Willis Wight, Sec.,	Milan,	March 8, 1904.
	John B. Lovejoy,	West Milan,	March 14, 1905.
	John H. Chandler,	Dummer,	March 13, 1906.
Dunbarton.	Charles Gourley,	Concord, R. F. D. No. 17,	March 9, 1904.
	William Woodson,	Concord, R. F. D. No. 17,	March 9, 1904.
	Horace Caldwell,	Concord, R. F. D. No. 17,	March 13, 1906.
Durham.	Dr. A. E. Grant, Chairman,	Durham,	April 20, 1904.
	F. W. Morse,	Durham,	April 20, 1904.
	Lucien Thompson,	Durham,	Nov. 24, 1906.
East Kingston.	Jos. D. Currier,	East Kingston,	April 16, 1904.
	Jos. G. Nelson, Sec.,	East Kingston,	April 22, 1905.
Easton.	D. A. Drew,	Easton,	May 27, 1904.
	A. T. Young,	Easton,	June 3, 1904.
Eaton.	Clement Drew, Sec.,	Eaton Center,	May 26, 1906.
	Charles O. Thompson,	Snowville,	April 3, 1906.
	Augustine W. Thompson,	Freedom, R. F. D.,	May 26, 1906.
Effingham.	James W. Leavitt, Sec.,	Effingham,	April 26, 1904.
	John L. Demeritt,	Effingham Falls,	April 20, 1905.
	John P. Glidden,	So. Effingham,	April 26, 1906.
Ellsworth.	Warren P. Buzzell, Sec.,	Ellsworth,	March 13, 1906.
	Charles H. Willey,	Ellsworth,	March 8, 1904.
	Wilber B. Avery,	Ellsworth,	March 14, 1905.
Enfield.	Edward A. Kenyon, Sec.,	Enfield,	April 25, 1904.
	Timothy E. Furnald,	Enfield Center,	May 7, 1904.
	Simon Ward,	Enfield,	May 26, 1906.
Epping.	Dr. A. C. Buswell,	Epping,	April, 1904.
	George A. Gilmore, Sec.,	Epping,	April, 1905.
	Dr. A. W. Mitchell,	Epping,	April, 1903.
Epsom.	Dr. Roscoe Hill, Sec.,	Epsom,	April 17, 1903.
	Josiah C. Lear,	Short Falls,	March 29, 1902.
	Edgar F. White,	Gossville,	May 7, 1904.
Errol.	L. C. Bragg,	Errol,	June 6, 1905.
Exeter.	Dr. William H. Nute, Sec.,	Exeter,	March 31, 1904.
	Frank O. Tilton,	Exeter,	March 31, 1905.
	Arthur S. French,	Exeter,	March 31, 1906.
Farmington.	No report from town clerk; three requests made.		
Fitzwilliam.	Dr. G. S. Emerson, Sec.,	Fitzwilliam,	Oct, 1. 1904.
	C. P. Bosworth,	Fitzwilliam Depot,	March 20, 1905.
	A. T. Byam,	Fitzwilliam,	April 10, 1906.
Francestown.	Dr. E. D. Stevens,	Francestown,	May 15, 1905.
	Martin L. Colburn,	Francestown,	May 15, 1905.
	James G. Woodbury, Sec.,	Francestown,	May 3, 1906.
Franconia.	Dr. H. L. Johnson, Sec.,	Franconia,	March 19, 1906.
	G. H. Burt,	Franconia,	March 18, 1905.
	W. A. Brooks,	Franconia,	March 11, 1904.
Franklin.	Dr. Chas. W. Adams, Sec.,	Franklin,	Jan. 1, 1906.
	Frank H. Daniell,	Franklin,	Jan. 1, 1906.
	Harry W. Gilchrist,	Main St. Station, Franklin,	Jan. 1, 1906.
Freedom.	George C. Leavitt,	Effingham Falls,	April 8, 1905.
	Christopher B. Chase,	Freedom,	Feb. 3, 1906.
	Dr. G. W. Lougee, Sec.,	Freedom,	April 14, 1906.
Fremont.	Harrison B. Ellis,	Fremont,	April 1, 1904.
	Stephen G. Sleeper,	Epping, R. F. D.,	April 10, 1905.
	Dr. Ernest W. Lowe, Sec.,	Fremont,	March 17, 1906.
Gilford.	Charles E. Curtis,	Lakeport, R. F. D. No. 1,	March 19, 1904.
	Charles P. Hunt,	Laconia, R. F. D. No. 4,	Dec. 18, 1905.
	J. Earl Sanborn,	Lakeport, R. F. D. No. 1,	March 17, 1906.

Gilmanton.	Harlan Paige, Sec.,	Gilmanton Iron Works,	March 17, 1906.
	George F. Kelley,	Pittsfield, R. F. D. No. 3,	March 17, 1906.
Gilsum.	Dr. I. A. Loveland, Sec.,	Gilsum,	May 7, 1904.
	Allen Hayward,	Gilsum,	March 16, 1905.
	John H. Laing,	Gilsum,	May 22, 1906.
Goffstown.	Dr. E. B. Swett,	Grasmere,	April 2, 1904.
	Dr. Frank Blaisdell, Sec.,	Goffstown,	April 4, 1905.
	Dr. Maurice A. Stark,	Goffstown,	March 17, 1906.
Gorham.	R. I. Heath,	Gorham,	March 18, 1904.
	Dr. Henry Marble, Sec.,	Gorham,	April 10, 1905.
	Thomas Wight,	Gorham,	March 24, 1906.
Goshen.	Orra S. Lear,	Mill Village,	April 7, 1904.
	James W Rogers,	Mill Village,	April 29, 1905.
	Dr. Fred P. Jones, Sec.,	Mill Village,	March 27, 1906.
Grafton.	Augustus F. Hoyt,	Grafton,	August 27, 1904.
	Perseus W Wing, Sec.,	East Grafton,	April 22, 1905.
Grantham.	H. W. Hurd,	Grantham,	April 21, 1903.
	Perley Walker,	Grantham,	April 21, 1906.
	J. M. Horne,	Grantham,	April 19, 1904.
Greenfield.	Dr. N. F. Cheever, Sec.,	Greenfield,	April 23, 1906.
	John K. Felch,	Greenfield,	April 23, 1906.
	Woodbury P Hopkins,	Greenfield,	Sept. 8, 1906.
Greenland.	John P. Weeks,	Greenland,	April 14, 1906.
	Dr. Percy G. Drake, Sec.,	Greenland,	March 14, 1905.
Greenville.	Henry I. Whitney	Greenville,	March 23, 1904.
	Dr. Byron D. Pease,	Greenville,	March 17, 1905.
	Henry S. Farrar,	Greenville,	March 15, 1906.
Groton.	B. S. Kinne,	North Groton,	May 2, 1904.
	P. M. Plummer,	Groton,	Dec. 4, 1906.
	W. H. Hunkins,	Groton,	Dec. 4, 1906.
Hampstead.	Irving Leighton, Sec.,	East Hampstead,	April 2, 1904.
	Dr. Elmer E. Lake,	Hampstead,	April 1, 1905.
	Daniel Emerson,	Hampstead,	March 21, 1906.
Hampton.	James A. Swift,	Hampton,	April 28, 1906.
	George E. Garland, Sec.,	Hampton,	April 28, 1906.
	Dr. E. Henry Thompson,	Hampton,	April 24, 1904.
Hampton Falls.	Arthur W Chase, Sec.,	Hampton Falls,	April 23, 1904.
	John N. Sanborn,	Hampton Falls,	April 30, 1905.
	J. Edward Brown,	Hampton Falls,	May 16, 1906.
Hancock.	Andrew B. Stone,	Hancock,	March 31, 1906.
	Wilfred M. Davis, Sec.,	Hancock,	March 31, 1905.
	Charles H. Dutton,	Bennington,	March 25, 1901.
Hanover.	Dr. John M. Gile, Sec.,	Hanover,	May 1, 1906.
	Bert C. Church,	Hanover Center,	May 1, 1906.
	Willie G. Spencer,	Etna,	May 1, 1906.
Hanover Precinct.	John V. Hazen,	Hanover,	Elected at Precinct Meeting.
	Perley R. Bugbee, Sec.,	Hanover,	
	Chandler P. Smith,	Hanover,	
Harrisville.	Bernard F Bemis, Sec.,	Chesham,	Sept. 5, 1903.
	Dr. A. G. Byron,	Harrisville,	April 22, 1904.
	Thomas J. Winn.	Harrisville,	April 14, 1905.
Haverhill.	Ezra B. Willoughby,	North Haverhill,	April 2, 1906.
	George S. Smith,	Pike,	July 5, 1905.
	Dr. H. C. Stearns, Sec.,	Haverhill,	Oct. 2, 1901.
Hebron.	Albert E. Moore,	Hebron,	March 8, 1904.
	Frederick Clement,	Hebron,	April 20, 1905.
	Fred B. Huckins,	Hebron,	May 5, 1906.
Henniker.	Dr. George H. Sanborn,	Henniker,	May 5, 1906.
	George H. Dodge,	Henniker,	March 18, 1905.
	Curtis B. Childs, Sec.,	Henniker,	April 12, 1904.

Hill.	Jean M. Shaw, Sec.,	Hill,	April 1, 1905.
	Alfred A. Bartlett,	Hill, R. F. D.,	April 1, 1904.
Hillsborough.	Dr. Warren P Grimes,	Hillsborough Bridge,	April 4, 1903.
	Leon E. Annis,	Hillsborough Bridge,	April 18, 1903.
	Dr. John Goodell,	Hillsborough,	May 24, 1904.
Hinsdale.	Frederick S. Leonard, Sec.,	Hinsdale,	Sept. 22, 1905.
	Henry C. Spaulding,	Hinsdale,	June 12, 1905.
	Dr. Albra Whitmore,	Hinsdale,	March 23, 1905.
Holderness.	John H. Evans, Jr.,	Plymouth, R. F. D. No. 4,	April 14, 1904.
	Curtis G. Burleigh,	Ashland, R. F. D. No. 1,	April 3, 1905.
	Lawrence J. Webster, Sec.,	Holderness,	April 17, 1906.
Hollis.	Samuel F. Woods,	Hollis,	Oct. 12, 1906.
	Dr. George S. Hazard,	Hollis,	Sept. 29, 1906.
	Charles E. Hardy,	Hollis,	Oct. 4, 1906.
Hooksett.	John. C. Dutton,	Hooksett,	April 7, 1902.
	Frank A. Thomas,	Manchester, R. F. D. No. 9,	April 12, 1902.
	Dr. T. M. Togus, Sec.,	Hooksett,	April 2, 1903.
Hopkinton.	William C. Russ,	Hopkinton,	May 17, 1906.
	Dr. George C. Blaisdell,	Contoocook,	March 21, 1905.
	Frank I. Morrill, Sec.,	Contoocook,	April 1, 1901.
Hudson.	C. E. Walsh, Sec.,	Hudson,	May 1, 1904.
	James E. Merrill,	Hudson,	May 31, 1905.
	Dr. H. O. Smith,	Hudson,	May 20, 1906.
Jackson.	A. C. Harriman, Sec.,	Jackson,	May 2, 1903.
	Frank H. Wilson,	Jackson,	April 3, 1901.
	Willis B. Hodge,	Jackson,	April 29, 1902.
Jaffrey.	Myron L. Cutler,	East Jaffrey,	March 9, 1904.
	William F Coolidge,	East Jaffrey,	March 26, 1904.
	Dr. F. C. Sweeney,	East Jaffrey,	April 16, 1906.
Jefferson.	Dr. George E. Dimick,	Jefferson,	March 8, 1904.
	F. O. Glidden, Sec.	Jefferson,	March 14, 1905.
	Dr. C. H. Burnham,	Jefferson,	March 13, 1906.
Keene.	L. Wellington, Esq., Sec.,	Keene,	Jan. 2, 1906.
	Dr. Frank D. Worcester,	Keene,	Jan. 3, 1905.
	Charles G. Shedd,	Keene,	Jan. 5, 1904.
Kensington.	Arthur W. Evans,	East Kingston,	July 1, 1905.
	Frank A. Batchelder,	Kensington,	April 6, 1905.
	Sidney C. Chase,	Kensington,	April 18, 1906.
Kingston.	Dr. C. P. F. Joyce,	Kingston,	April 1, 1904.
	Dr. H. L. Sweeney, Sec.,	Kingston,	March 18, 1905.
	George M. Bakie,	Kingston,	March 17, 1906.
Laconia.	Dr. W. H. True, Sec.,	Laconia,	March 27, 1906.
	Dr. J. A. Wrisley, Pres.,	Lakeport,	March 28, 1905.
	Fred E. Moore,	The Weirs,	March 22, 1904.
Lancaster.	Jared I. Williams,	Lancaster,	March 25, 1904.
	Dr. Frank Spooner, Sec.,	Lancaster,	March 25, 1905.
	Dr. Harry B. Carpenter,	Lancaster,	April 17, 1906.
Landaff.	Joel M. Johnson,	Lisbon, R. F. D. No. 2,	April 25, 1903.
	Oscar S. Merrill,	Lisbon, R. F. D. No. 2.	April 13, 1904.
	George H. Young,	Lisbon, R. F. D. No. 2,	May 31, 1905.
Langdon.	Herbert A. Holmes, Sec.,	Langdon,	June 4, 1904.
	Charles A. Jefts,	Drewsville,	April 1, 1905.
	Dr. Charles M. Lufkin,	Alstead,	April 2, 1906.
Lebanon.	Dr. F. Von Tobel, Sec.,	Lebanon,	Feb. 6, 1903.
	C. E. Hibbard,	Lebanon,	June 25, 1906.
	Dr. M. S. Woodman,	West Lebanon,	April 29, 1904.
Lee.	John C. Bartlett, Sec.,	Newmarket, R. F. D.,	April 15, 1902.
	William S. Caldwell,	Dover, R. F D. No. 5,	April 15, 1902.
Lempster.	Elmer E. Howe,	East Lempster,	Nov. 8, 1904.
	Loren A. Noyes, Sec.,	East Lempster,	April 29, 1905.
	George W. Hurd,	Lempster,	May 11, 1906.

Lincoln.	E. D. Burtt,	Lincoln,	
	J. H. Henry,	Lincoln,	
Lisbon.	Dr. Frank E. Spear,	Lisbon,	April 3, 1906.
	J Henry Wells,	Sugar Hill,	March 31, 1905.
Litchfield.	James Hapwood, Sec.,	Hudson, R. F. D. No. 1,	1904.
	Clinton E. Leach,	Manchester, R. F. D. No. 5,	1905.
	Charles H. Chase,	Hudson, R. F. D. No. 1,	
Littleton.	George W. Smith, Sec.,	Littleton,	March 15, 1906.
	John Smillie,	Littleton,	March 14, 1904.
	Harry L. Heald,	Littleton,	March 20, 1905.
Livermore.	L. D. Goulding, Sec.,	Livermore,	March 13, 1906.
	George S. Payne,	Livermore,	March 13, 1906.
Londonderry.	Charles S. Greeley,	Londonderry,	May 13, 1902.
	Dr. W. Richardson, Sec.,	Londonderry,	April 10, 1903.
	Samuel P. Roble,	West Derry, R. F. D. No. 1,	April 25, 1904.
Loudon.	Samuel M. True,	Loudon,	Oct. 14, 1904.
	James Lake,	Pittsfield,	
	Edwin H. Sleeper,	Loudon,	Oct. 20, 1906.
Lyman.	O. M. Parker,	Lisbon, R. F. D. No. 1,	May 15, 1905.
	J. F. Olin,	Lisbon, R. F. D. No. 1,	May 19, 1905.
	W. S. Bennett,	Lisbon, R. F D. No. 3,	April 21, 1906.
Lyme.	Dr. G. W. Weymouth,	Lyme,	April 18, 1904.
	Henry W. Abbott,	Lyme,	April 14, 1905.
	Payson E. Fairfield,	Lyme,	April 13, 1906.
Lyndeborough.	Edward W. Dolliver,	So. Lyndeborough,	April 14, 1905.
	Andy Holt, Sec.,	So. Lyndeborough,	April 14, 1905.
	George T. Hutchinson,	Wilton, R. F. D.,	April 23, 1906.
Madbury.	Greenleaf S. Drew, Sec.,	Dover, R. F. D.,	May, 1904.
	Frank J. Bemis,	Madbury,	May, 1905.
	Arthur W. Simpson,	Dover,	May, 1905.
Madison.	Dr. W. G. Martin, Sec.,	Madison,	April 15, 1902.
	H. C. Harriman,	Madison,	May 20, 1901.
	Eugene Alley,	Madison,	April 21, 1903.
Manchester.	Dr. J. E. A. Lanouette,	Manchester,	Feb. 1, 1906.
	William K. Robbins, Sec.,	Manchester,	Feb. 1, 1904.
	William J. Starr,	Manchester,	Feb. 1, 1905.
Marlborough.	D. W Tenney	Marlborough,	Jan. 29, 1905.
	Dr. W A. Aldrich, Sec.,	Marlborough,	Sept. 24, 1904.
	A. N White,	Marlborough,	April 8, 1903.
Marlow.	Waldo H. Perkins,	Marlow,	March 15, 1904.
	Harlan E. Honey, Sec.,	Marlow,	March 14, 1905.
	Arthur M. Davis,	Marlow,	March 19, 1906.
Mason.	John T. Smith,	Mason,	April, 1904.
	Winfred Whitaker,	Mason,	April, 1905.
	Charles B. Goodwin,	Mason,	April, 1906.
Meredith.	Erastus W. Prescott,	Meredith,	June 20, 1906.
	Dr. Newell C. Nutting,	Meredith,	July 20, 1906.
Merrimack.	No legal board elected; not appointed as the law requires.		
Middleton.	Frederick Orne, Sec.,	Middleton,	May 2, 1903.
	Willie A. Chapman,	Middleton,	May 2, 1905.
	George J. Tufts,	Middleton,	July 10, 1905.
Milan.	C. E. Hight,	Milan,	May 10, 1906.
	S. E. Coffin,	Milan,	May 5, 1905.
	F. H. Sweetser,	Milan,	May 5, 1905.
Milford.	Dr. W. H. W. Hinds, Sec.,	Milford,	March 15, 1904.
	Dr. Eugene Wason,	Milford,	March 26, 1906.
	Benjamin F. Foster,	Milford,	March 25, 1905.
Milton.	Dr. M. A. H. Hart, Sec.,	Milton,	April 11, 1903.
	Elbridge W. Fox,	Milton Mills,	April 13, 1904.
	Harry D. Coles,	Milton,	April 18, 1905.

Mont Vernon.	C. H. Raymond,	Milford,	April 17, 1906.
	J. M. Fox,	Mont Vernon,	April 17, 1906.
Monroe.	O. H. Schoff,	Monroe,	March 24, 1906.
	W. S. Smith,	North Monroe,	March 24, 1906.
Moultonborough.	Frank S. Lovering, Sec.,	Moultonborough,	July 18, 1906.
	Henry R. Gould,	Center Harbor,	April 4, 1904.
	George H. Richardson,	Moultonborough,	April 16, 1905.
Nashua.	Dr. Dennis M. Shea, Sec.,	Nashua,	Jan. 1, 1906.
	George H. Woodbury,	Nashua,	Jan. 1, 1906.
	John M. Earley,	Nashua,	Jan. 1, 1906.
Nelson.	Frank E. Foster,	Munsonville,	June 21, 1906.
	William S. Mansfield,	Munsonville,	April 12, 1906.
	George W. Osgood,	Chesham,	April 11, 1906.
New Boston.	Charles F. Marden, Sec.,	New Boston,	March 18, 1904.
	Dr. Charles A. Weaver,	New Boston,	March 18, 1905.
Newbury.	Charles H. M. Perkins,	Mount Sunapee,	April 14, 1905.
	George J. Messer,	Newbury,	June 20, 1906.
Newcastle.	E. B. Baker, Sec.,	Newcastle,	March 8, 1904.
	S. C. Flanders,	Newcastle,	March 14, 1905.
New Durham.	Eben E. Berry,	New Durham, R. F. D.,	April 6, 1904.
	Augustus W. Hayes,	New Durham,	April 13, 1905.
	Edwin R. Young,	New Durham, R. F. D.,	April 4, 1906.
Newfields.	Dr. A. H. Varney, Sec.,	Newfields,	April 7, 1905.
	H. W. Smith,	Newfields,	Dec. 29, 1904.
	George W. Paul,	Newfields,	Jan. 1, 1905.
New Hampton.	Dr. A. S. Bronson, Sec.,	New Hampton,	April 30, 1904.
	William R. Roble,	Winona,	April 28, 1906.
	Ira E. Gray	New Hampton,	April 28, 1906.
Newington.	Benjamin S. Hoyt,	Newington,	Aug. 14, 1901.
	John M. Moulton,	Newington,	April 16, 1903.
New Ipswich.	Frank H. Whittemore,	Smithville,	April 16, 1904.
New London.	Dr. C. A. Lamson,	Elkins,	March, 1906.
	A. B. Stimson,	New London,	Nov. 14, 1906.
	Dr. N. L. Griffin, Sec.,	New London,	Nov. 14, 1906.
Newmarket.	Dr. C. A. Morse, Sec.,	Newmarket,	April 30, 1904.
	Joseph B. Bennett,	Newmarket,	May 6, 1906.
	Dr. George H. Towle,	Newmarket,	May 8, 1906.
Newport.	Dr. John L. Cain,	Newport,	April 23, 1906.
	Arthur C. Bradley,	Newport,	April 23, 1906.
	Fred E. Lovell, Sec.,	Newport,	April 27, 1906.
Newton.	Dr. John F. Axtell,	Newton,	March 8, 1904.
	Charles Dart,	Newton,	March 14, 1905.
	Jesse E. George, Sec.,	Newton Junction,	March 17, 1906.
Northfield.	George S. Morrison,	Tilton,	March 29, 1905.
	Harry W. Muzzey, Sec.,	Tilton,	March 31, 1906.
North Hampton.	Dr. H. A. White, Sec.,	North Hampton,	July 20, 1904.
	E. L. Dalton,	North Hampton,	
	Albert Bachelder,	Little Boar's Head.	
Northumberland.	Dr. C. C. O'Brion,	Groveton,	March 23, 1906.
	Walter C. Hamilton,	Groveton,	March 23, 1906.
	Phil S. Terrill,	Groveton,	March 23, 1906.
Northwood.	William D. Watson,	Northwood,	April 15, 1905.
	Dr. John W. Pray,	Northwood,	May 23, 1903.
	W. F. Slack,	Northwood Ridge,	May 23, 1903.
Nottingham.	R. E. Tuttle,	North Nottingham,	April, 1904.
	M. C. Tuttle,	Nottingham,	April, 1905.
	Dr. Fred Fernald, Sec.,	Nottingham,	April, 1906.
Orange.	Warren F. Terrill,	Canaan,	April 11, 1904.
	Walter H. Ford,	Canaan,	April 21, 1905.
	Russell Sanborn,	Canaan,	April 21, 1905.

Orford.	Walter R. Barnes,	Orford,	March 8, 1904.
	Robert O. Carr,	Orford,	March 14, 1905.
	Ezra C. Chase,	Orford,	March 13, 1906.
Ossipee.	Dr. E. W. Hodsdon,	Centerville,	July 16, 1904.
	Dr. E. B. Andrews,	Ossipee,	April 1, 1904.
Pelham.	Daniel M. Webster,	Pelham,	May 12, 1905.
	Willis H. Nutting,	Pelham,	Sept. 10, 1906.
	Dr. Edw. Hyde,	Pelham,	Aug. 24, 1906.
Pembroke.	Fred M. Millard,	Suncook,	April 5, 1902.
	Fred W. Saltmarsh, Sec.,	Suncook,	April 23, 1903.
	Bert G. Spaulding,	Suncook,	April 1, 1905.
Peterborough.	Dr. Charles H. Cutler,	Peterborough,	May 1, 1906.
	Daniel M. White,	Peterborough,	April 15, 1905.
	Charles A. Jaquith, Sec.,	Peterborough,	April 14, 1904.
Piermont.	John F. Simpson,	Piermont,	May 13, 1898.
	Hubbard S. Stanley,	Piermont,	March 14, 1903.
	H. Eugene Morrison, Sec.,	Piermont,	Oct. 25, 1904.
Pittsburg.	George D. Keysar,	Beecher Falls, Vt.,	May 4, 1903.
	H. Augustus Blanchard,	Pittsburg,	April 14, 1905.
	James H. Bacon,	Pittsburg,	April 14, 1905.
Pittsfield.	Lewis Jenkins,	Pittsfield.	
	True H. Maxfield, Sec.,	Pittsfield,	March 20, 1905.
	Frank O. George,	Pittsfield,	Feb. 25, 1905.
Plainfield.	Edwin G. Kenyon,	Plainfield,	March 11, 1904.
	Nathan R. Andrews,	Meriden,	May 22, 1906.
Plaistow.	Arthur E. Hoyt,	Atkinson Depot,	March 23, 1905.
	John H. Noyes,	Plaistow,	July 28, 1903.
Plymouth.	L. D. Fogg,	Plymouth,	March 22, 1904.
	W. J. Randolph, Sec.,	Plymouth,	March 18, 1905.
	Geo. W. Little,	Plymouth,	April 23, 1906.
Portsmouth.	Dr. A. B. Sherburne,	Portsmouth,	March 9, 1906.
	Albert H. Adams,	Portsmouth,	Jan. 11, 1906.
	Herbert L. Taylor Sec.,	Portsmouth,	Jan. 11, 1906.
Randolph.	Irving R. Leighton,	Randolph,	March 14, 1905.
	Francis C. Wood, Sec.,	Randolph,	March 14, 1905.
	Thaddeus S. Lowe,	Randolph,	March 13, 1906.
Raymond.	J. Earl Ladd, Sec.,	Raymond,	April 16, 1904.
	Dr. George H. Guptill,	Raymond,	April 15, 1905.
	J. A. Blake,	Raymond,	April 5, 1906.
Richmond.	Leason Martin, Sec.,	North Richmond,	May 23, 1905.
	Almon Twitchell,	North Richmond,	July 1, 1905.
	Asa H. Bullock,	Winchester, R. F. D. No. 4,	April 18, 1906.
Rindge.	Lawrence B. Hatch, Sec.,	West Rindge,	April 15, 1903.
	Walter B. Hart,	Rindge,	May 1, 1905.
	Arthur E. Taggart,	West Rindge,	Aug. 10, 1905.
Rochester.	S. W. Goodwin,	Rochester,	Jan. 6, 1904.
	Dr. Dudley L. Stokes,	Rochester,	Jan. 4, 1905.
	Dr. Forrest L. Keay, Sec.,	Rochester,	Jan. 3, 1906.
Rollinsford.	George E. Gorman,	Salmon Falls,	April 15, 1905.
	Edward J. Leonard,	Salmon Falls,	April 15, 1905.
	Ralph S. Wentworth, Sec.,	Salmon Falls,	Aug. 6, 1906.
Roxbury.	Almon A. Davis,	Keene,	April 15, 1904.
	Cyrus K. Ellis,	Keene,	April 15, 1906.
	C. M. C. Phillips, Sec.,	East Sullivan,	April 15, 1905.
Rumney.	William G. Cook,	Rumney Depot,	April 23, 1904.
	Dr. A. S. Russell,	Rumney,	April 22, 1905.
Rye.	Dr. C. F. Patterson, Sec.,	Rye,	April 6, 1906.
	Alfred C. Philbrick,	Rye,	April 6, 1906.
Salem.	Dr. Lewis F. Soule,	Salem Depot,	April 4, 1905.
	John J. Hunt, Sec.,	Salem Depot,	April 4, 1905.
	Woodbury J. Brown,	Salem Depot,	April 4, 1905.

Salisbury.	John Shaw,	West Salisbury,	April 5, 1904.
	Charles A. Green, Sec.,	Andover, R. F. D. 1, Box 36,	March 31, 1905.
	Buron W. Sanborn,	Andover, R. F. D. No. 1, Box 9,	May 10, 1906.
Sanbornton.	George B. Lane, Sec.,	Sanbornton,	Nov. 7, 1905.
	Edwin W. Lane,	Hill,	Feb. 24, 1906.
	C. H. Odell,	Laconia,	March 27, 1906.
Sandown.	John G. Goodwin,	Sandown,	May 8, 1905.
	Elwin C. Mills, Sec.,	Sandown,	Feb. 16, 1905.
	Burton S. Lovering,	Sandown,	Feb. 24, 1905.
Sandwich.	Dr. Albert B. Hoag,	Center Sandwich,	April 15, 1903.
	Dr. Fred E. Bryar,	North Sandwich,	May 28, 1904.
	Charles R. Fellows,	North Sandwich,	April 13, 1905.
Seabrook.	Emery N. Eaton,	So. Seabrook,	May 19, 1904.
	Geo. P. Eaton, Jr.,	So. Seabrook,	May 19, 1905.
	Ananias Fowler,	So. Seabrook,	May 29, 1906.
Sharon.	B. H. Sanders, Sec.,	Peterborough,	April 20, 1904.
	John F. Fitzgerald,	Peterborough,	April 25, 1905.
	Edwin W. Smith,	Peterborough,	April 27, 1906.
Shelburne.	No report from town clerk	three requests made.	
Somersworth.	L. C. Patten, Chairman,	Somersworth,	April 1, 1906.
	Clement Roy, Clerk,	Somersworth,	April 1, 1906.
	Dr. Napoleon Leduc,	Somersworth,	April 1, 1906.
South Hampton.	S. M. Prescott, Sec.,	Amesbury, Mass.,R. F. D. No. 1,	April 15, 1905.
	Lemuel Jones,	Amesbury, Mass., R. F. D. No. 1,	May 4, 1904.
	George B. Palmer,	Amesbury, Mass., R. F. D. No. 1,	April 3, 1903.
Springfield.	Orin F. Hill,	Springfield,	March 31, 1906.
	Dr. David P. Goodhue,	West Springfield,	March 31, 1906.
Stark.	Milton I. Cole,	Crystal,	April 23, 1904.
	James W. Hickey,	Stark,	April 7, 1906.
Stewartstown.	Joseph N. Walker,	West Stewartstown,	June 6, 1906.
	Dr. F. W. McLaughlin,	Stewartstown,	June 6, 1906.
Stoddard.	James D. Cutter,	Stoddard,	May 1, 1905.
	Willard B. Moody,	Hancock,	May 1, 1905.
Strafford.	Dr. D. Grant, Sec.,	Center Strafford.	April 5, 1906.
	G. T. Foss,	Center Strafford.	Oct. 19, 1904.
	H. E. Tasker,	South Barnstead,	June 3, 1905.
Stratford.	John C. Pattee,	Coos,	Nov. 5, 1906.
	Dr. F. W. Evans,	Coos,	March 14, 1905.
	Alvin L. Wheeler,	Stratford,	March 8, 1904.
Stratham.	Fred N. Edmunds, Sec.,	Stratham,	April 2, 1904.
	John W. Marsh,	Stratham,	May 4, 1906.
	Charles Grant, Jr.,	Stratham,	May 1, 1906.
Sullivan.	Edwin F. Nims,	Sullivan,	Aug. 2, 1904.
	Frank E. Jewett,	Sullivan,	April 20, 1905.
	Charles W. Hubbard, Sec.,	East Sullivan,	April 18, 1906.
Sunapee.	Albert D. Felch, Sec.,	Sunapee,	April 15, 1905.
	Charles A. Knowlton,	Sunapee,	April 14, 1906.
	Willard W. Chase,	George's Mills,	April 4, 1906.
Surry.	F. E. Ellis,	Surry,	March 8, 1904.
	F. E. Nesmith,	Surry,	March 14, 1905.
	S. J. Wilder,	Surry,	March 13, 1906.
Sutton.	F. E. Ferry,	South Sutton,	April 2, 1904.
	Harry S. Watkins,	Sutton,	May 9, 1906.
	F. L. Howe,	North Sutton,	May 9, 1906.
Swanzey.	Dr. John C. Bourn, Sec.,	East Swanzey,	Aug. 6, 1900.
	Dr. George I. Cutler,	West Swanzey,	March 16, 1901.
	John Phillips,	Swanzey,	March 31, 1904.
Tamworth.	Dr. E. Remick,	Tamworth,	April 1, 1905.
	George F. Batchelder,	Tamworth,	April 12, 1906.

Temple.	W. E. Hayward,	Temple,	March 31, 1906.
	E. B. Edwards, Sec.,	Wilton,	March 26, 1904.
Thornton.	Frank L. Houston, Sec.,	Campton Village,	Sept. 9, 1906.
	John Merrill,	Campton Village,	Sept. 9, 1906.
	Frank L. Hazeltine,	West Thornton,	Sept. 9, 1906.
Tilton.	Charles A. Towns,	Tilton,	Jan. 6, 1904.
	Dr. C. R. Gould, Sec.,	Tilton,	March 31, 1905.
	A. T. Cass,	Tilton,	July 18, 1906.
Troy.	Henry L. Barnard,	Troy,	April 22, 1904.
	Dr. Harry S. Platts,	Troy,	March 18, 1905.
	Dr. Melvin T. Stone, Sec.,	Troy,	March 17, 1906.
Tuftonborough.	J. M. Haley,	Center Tuftonborough,	April 27, 1905.
	Joseph C. Blake,	Mirror Lake,	1905.
	John A. Stackpole,	Tuftonborough,	1906.
Unity.	Frank Wright,	East Unity,	April 17, 1905.
	Frank Reed, Sec.,	Unity,	April 17, 1905.
	Mervin J. Whipple,	North Charlestown,	April 19, 1906.
Wakefield.	John A. Stevens,	Union,	April 22, 1905.
	Dr. Harry A. Moody,	Sanbornville,	April 17, 1906.
	Dr. W. S. Davis,	Sanbornville,	April 17, 1906.
Walpole.	John H. Brown,	North Walpole,	Dec. 30, 1901.
	Dr. Oscar L. Corliss,	Walpole,	Dec. 3, 1904.
Warner.	Edmund C. Cole, Sec.,	Warner,	May 6, 1903.
	Dr. John F. Merrill,	Warner,	April 19, 1904.
	Charles H. Jones,	Warner,	April 1, 1905.
Warren.	Dr. Francis L. Gerald,	Warren,	March 11, 1904.
	Charles H. Arnold,	Warren,	April 6, 1905.
	Dr. G. A. Weaver,	Warren,	April 26, 1906.
Washington.	J. Frank Crosby,	East Washington,	April 21, 1905.
	Albert T. Wright,	Washington,	April 21, 1905.
Waterville.	Joseph L. Tuttle, Sec.,	Waterville,	Dec. 12, 1906.
	George Gilman,	Campton Village,	Dec. 12, 1906.
	Llewellyn McGuire,	Waterville,	Dec. 12, 1906.
Weare.	Dr. Frank Eaton, Sec.,	East Weare,	March 17, 1906.
	W. W. Eastman,	South Weare,	April 30, 1904.
	Elbridge D. Peaslee,	North Weare,	1906.
Webster.	Daniel J. Holmes,	Penacook, R. F. D. No. 16,	March, 1904.
	Joseph H. Noyes, Sec.,	Contoocook, R. F. D. No. 1,	March, 1905.
	Dr. Henry Dodge,	Webster,	March, 1906.
Wentworth.	Dr. Samuel Fraser, Sec.,	Wentworth,	April 14, 1905.
	Albert L. Davis,	Wentworth,	June 18, 1906.
	Elias McGinnis,	West Rumney,	June 20, 1906.
Westmoreland.	Carroll F. Capron,	East Westmoreland,	March 16, 1901.
	Dr. James A. Craig,	Westmoreland,	Sept. 18, 1906.
	Fred E. Cole,	Ware's Ferry.	
Whitefield.	Charles P. Carleton,	Whitefield,	April 14, 1904.
	Ezra E. Weeks,	Whitefield,	May 5, 1905.
	Dr. G. H. Morrison, Sec.,	Whitefield,	May 3, 1906.
Wilmot.	James R. Currier,	Wilmot,	May 20, 1904.
	Fred E. Goodhue, Sec.,	Wilmot,	May 15, 1905.
Wilton.	Dr. Edmund R. Staniford,	Keene,	March 8, 1904.
	Dr. George W. Hatch, Sec.,	Wilton,	March 14, 1905.
	Frank E. Proctor,	Wilton,	March 13, 1906.
Winchester.	F. P. Kellom, Chairman,	Winchester,	March 26, 1906.
	Dr. Alban J. Lobdell,	Winchester,	March 20, 1905.
	Dr. William A. Basch,	Ashuelot,	March 31, 1904.
Windham.	W. A. Love,	Windham,	May 7, 1906.
	C. B. Clark,	Windham Depot,	May 8, 1905.
	H. C. Russell,	West Windham,	July 5, 1904.

Windsor.	Joseph C. Chapman,	Hillsborough Bridge,	March, 1906.
	George M. Russell,	Hillsborough,	March, 1905.
	Joseph R. Nelson, Sec.,	Hillsborough,	March, 1906.
Wolfeborough.	Dr. N. H. Scott,	Wolfeborough,	May 27, 1905.
	Dr. Fred C. Tobey,	Wolfeborough,	May 27, 1905.
	Dr. Fred E. Clow, Sec.,	Wolfeborough,	March 31, 1906.
Woodstock.	Gideon Rude, Sec.,	North Woodstock,	March 21, 1906.
	J. C. Muchmore,	North Woodstock,	March 30, 1906.
	T. F. Sawyer,	Woodstock,	March 30, 1906.
Woodsville.	Arthur E. Davis,	Woodsville,	March 30, 1906.
Precinct.	Frank W. Baird,	Woodsville,	March 30, 1906.
	Albert H. Leighton, Sec.,	Woodsville,	March 30, 1906.

INDEX.

INDEX.

	Page
Acworth, report on water supply	8
Albany, report on water supply	8
Alexandria, report on water supply	8
Allenstown, report on water supply	8
Alstead, report on water supply	9
Alton and Alton Bay Sewerage and Water Supply	101
Notice to water-takers	106
Petition from board of health	101
Regulations of the state board of health for the protection of water supply	107
Alton, report on water supply	9
Amherst, report on water supply	10
Andover, report on water supply	11
Antiseptics (preservatives), foods containing them are adulterated	243
Antrim, report on water supply	11
A Sand Filter for the Home, by Robert Fletcher, Ph. D.	285
Ashland, report on water supply	12
Squam Lakes, petition from board of health	128
Atkinson, report on water supply	13
Auburn, report on water supply	13
Bacteriological examinations at state laboratory of hygiene	219
Baking powders and cream of tartar, report on examinations of	156
standard	244
Barnstead, report on water supply	13
Barrington, report on water supply	14
Bartlett, report on water supply	14
Bath, report on water supply	14
Bedford, report on water supply	15
Belmont, report on water supply	15
Bennington, report on water supply	16
Benton, report on water supply	16
Berlin, report on water supply	16
water supply and typhoid fever, special report on	110
Bethlehem, report on water supply	17
Beverages, adulterated, results of eaxminations	144
miscellaneous, report of examinations of	145
Births, marriages and deaths, law to perfect records of	xi
divorces and deaths, records of	xi
Boards of health, local	v
Board of health, state, members of	iii
Boscawen, report on water supply	18

Bow, report on water supply 19
Bradford, report on water supply 19
Brentwood, report on water supply 19
Bridgewater, report on water supply 19
Bristol, report on water supply 19
Brookfield, report on water supply 20
Brookline, report on water supply 20
Butter, renovated or process, standard 244
standard 244
Campton, report on water supply 20
Canaan, report on water supply 21
West, typhoid-infected well at 123
Candia, report on water supply 21
Candy, adulteration of, law concerning 239
and the use of adulterated glucose in its manufacture 150
cheap, results of examinations of 153
standard 244
Canned goods, standard 244
Canterbury, report on water supply 22
Carroll, report on water supply 22
Catsups, adulterated, results of examinations of 154
standard 244
Center Harbor water supply, report on 22
petition from board of health 128
Charlestown, report on water supply 22
Chatham, report on water supply 23
Cheese, standard 244
Chester, report on water supply 23
Chesterfield, report on water supply 23
Chichester, report on water supply 23
Cider, standard 244
Claremont, report of board of health on sickness from suspected milk 134
report on water supply 23
Clarksville, report on water supply 25
Coffee, standard 245
compounds, standard 245
misbranded, results of examinations of 156
Colebrook, report on water supply 25
Coloring matter in foods prohibited 243
Columbia, report on water supply 26
Commission of lunacy viii
Concord, report on water supply 26
Consumption, a curable disease 261
change of climate in 265
disinfectants to be used 267
early symptoms should be recognized 260
friendly advice concerning 263

Consumption, how to avoid it 258
in the sick-room 264
open-air treatment at home 266
pulmonary, notification in xv
restriction and prevention of xv
sanatorium for 267
sputum should be destroyed 264
the prevalence of 254
what it is 257
what not to do 262
Consumptive, a, not necessarily dangerous 261
Conway, report on water supply 28
Cornish, report on water supply 29
Cream, standard 245
Cream of tartar and baking powders, report on examinations of 156
Croydon, report on water supply 29
Dalton, report on water supply 29
Danbury, report on water supply 29
Danville, report on water supply 30
Deaths, records of xi
Deerfield, report on water supply 30
Deering, report on water supply 30
Derry, report on water supply 30
Diphtheria examinations 228–232
Divorce records xi
Dorchester, report on water supply 30
Dover, report on water supply 30
Dover Water Works 113
Drugs and poisons, law regarding sale of 239
inspection, report on 183
Dublin, report on water supply 32
Dummer, report on water supply 32
Dunbarton, report on water supply 32
Durham, report on water supply 33
East Kingston, report on water supply 33
Eastman, Attorney-General, on the protection of Squam Lakes water supply 130
Easton, report on water supply 33
Eaton, report on water supply 33
Effingham, report on water supply 33
Elkins, report on water supply 34
Ellsworth, report on water supply 33
Enfield, report on water supply 34
Epping, report on water supply 35
Epsom, report on water supply 35
Errol, report on water supply 35
Examination of Alcoholic and Malt Liquors 191
Exeter, report on water supply 35

Farmington, report on water supply 36
Filter, a sand for the home ..... xvi, 285
Fish and meat products, report on examinations of 169
Fitzwilliam, report on water supply 36
Flavoring extracts, standard 245
Fletcher, Prof. Robert. A Sand Filter for the Home 285
report on the water supply of Alton Bay 104
Flour, standard 245
gluten, standard 245
Foods, adulterations and sale of, law regarding 239
inspections, summary of 182
definitions and requirements 243
miscellaneous, report on examinations of 181
samples for analysis, how collected 248
standards and definitions 242
Food and Drug Inspection, by C. D. Howard, chemist 141
Francestown, report on water supply 36
Franconia, report on water supply 37
Franklin, report on water supply 37
Franklin Water Supply, special report on 117
Freedom, report on water supply 41
Fremont, report on water supply 41
Fruits, canned, jellies and jams, report of examinations of 146
Fruits, dried, report on examinations of 156
Glucose, sulphurous acid in grams of 152
Gluten flour, standard 245
Gilford, report on water supply 41
Gilmanton, report on water supply 41
Gilsum, report on water supply 41
Ginger Ale, report on examinations of 144
Goffstown, report on water supply 41
Gorham, report on water supply 42
Goshen, report on water supply 43
Grafton, report on water supply 43
Grantham, report on water supply 43
Grasmere, report on water supply 43
Greenfield, report on water supply 43
Greenland, report on water supply 43
Greenville, report on water supply 43
Groton, report on water supply 44
Hampstead, report on water supply 44
Hampton, report on water supply 44
Hancock, report on water supply 45
Hanover, report on water supply 46
Harrisville, report on water supply 48
Haverhill, report on water supply 48
Health officers, selectmen cannot discharge vi
to be appointed, not elected vi

Hebron, report on water supply 48
Henniker, report on water supply 48
Hill, report on water supply 49
Hillsborough, report on water supply 50
Hinsdale, report on water supply 51
Holderness, report on water supply 51
petition from board of health 128
Hollis, report on water supply 51
Honey, report on examinations of 157
standard 246
Hooksett, report on water supply 51
Hopkinton, report on water supply 52
Hops, sulphured, and their relation to the composition of malt liquors 158
Howard, C. D., report on Dover water works 113
food and drug inspection 141
Franklin water works 117
Lebanon water supply 119
Tannin in Coffee 186
Hudson, report on water supply 53
Jackson, report on water supply 53
Jaffrey, report on water supply 53
Jefferson, report on water supply 54
Jellies, standard 245
jams and canned fruits, report of examinations of 147
Keene, report on water supply 55
Kensington, report on water supply 55
Ketchup (See Catsup).
Kingsford, Dr. H. N., report on sickness at Claremont from suspected milk 135
Kingston, report on water supply 58
Laboratory of Hygiene, State ..... iii, xiv
Laconia, report on water supply 56
Lancaster, report on water supply 57
Landaff, report on water supply 58
Langdon, report on water supply 58
Lard, standard 246
Lebanon, report on water supply 58
special report on water supply 119
Lee, report on water supply 60
Lemon extract, report on examinations of 160
Lempster, report on water supply 60
Lime juice, report of examinations of 144
Lincoln, report on water supply 60
Liquors, adulterated, examination of 248
examination of, law regarding 248
distilled, results of analyses of 194
malt, results of analyses of 213
sulphured hops in relation to the composition of 158
and alcoholic, examination of 191

Lisbon, report on water supplies..... 60
Lisbon Water Supply, petition from board of health..... 125
regulations of State Board of Health for the protection of 126
special report on..... 125
Lisbon Water Works Co., letter from..... 125
Litchfield, report on water supply..... 61
Littleton, report on water supply..... 61
Livermore, report on water supply..... 62
Londonderry, report on water supply..... 62
Loudon, report on water supply..... 62
Lyme, report on water supply..... 62
Lyndeborough, report on water supply..... 63
Madbury, report on water supply..... 63
Madison, report on water supply..... 63
Malt extracts, report on examinations of..... 168
Manchester, report on water supply..... 63
Maple products, report on examinations of..... 163
Maple sugar, law regarding..... 239
Marlborough, report on water supply..... 65
Marlow, report on water supply..... 66
Marriages, records of..... xi
Mason, report on water supply..... 66
Meat products and fish, report on examinations of..... 169
Meredith, report on water supply..... 66
Merrimack, report on water supply..... 66
Middleton, report on water supply..... 66
Milan, report on water supply..... 67
Milford, report on water supply..... 67
Milk, preservatives in, report on examinations of..... 174
report on examinations of..... 172
standard 246
suspected, sickness from..... 134
Milton, report on water supply..... 68
Molasses, adulterated, report on examinations of..... 175
and syrups, standard..... 246
Monroe, report on water supply..... 68
Mont Vernon, report on water supply..... 68
Moultonborough, report on water supply..... 68
water supply, petition from board of health..... 128
Nashua, report on water supply..... 68
Nelson, report on water supply..... 68
New Boston, report on water supply..... 69
Newbury, report on water supply..... 69
Newcastle, report on water supply..... 70
New Durham, report on water supply..... 70
Newfields, report on water supply..... 70
New Hampton, report on water supply..... 70

Newington, report on water supply..... 70
New Ipswich, report on water supply..... 70
New London, report on water supply..... 70
Newmarket, report on water supply..... 71
Newport, report on water supply..... 71
Newton, report on water supply..... 72
Northfield, report on water supply..... 72
Northumberland, report on water supply..... 73
Northwood, report on water supply..... 73
Nottingham, report on water supply..... 73
Oleomargarine, standard 247
Olive Oil, standard..... 247
Orange, report on water supply..... 74
Orford, report on water supply..... 74
Ossipee, report on water supply..... 74
Oysters, report of examination of..... 176
Pelham, report on water supply..... 74
Pembroke, report on water supply..... 74
Penacook, report on water supply..... 75
Peterborough, report on water supply..... 76
Pickles and relishes, report on examination of..... 177
Piermont, report on water supply..... 76
Pittsburg, report on water supply..... 76
Pittsfield, report on water supply..... 76
Plainfield, report on water supply..... 77
Plaistow, report on water supply..... 78
Plymouth, report on water supply..... 78
Portsmouth, report on water supply..... 79
Preservatives, food: Sulphurous Acid and the Sulphites..... 189
Pure food laws of New Hampshire..... 239
Pure Food question, the..... xii
Randolph, report on water supply..... 81
Raymond, report on water supply..... 81
Relishes and pickles, report on examination of..... 177
Report of Food and Drug Inspection..... 139
Richmond, report on water supply..... 81
Rindge, report on water supply..... 81
Rochester, report on water supply..... 81
Rollinsford, report on water supply..... 82
Rumney, report on water supply..... 82
Rye, report on water supply..... 82
Saccharin, standard 247
Salem, report on water supply..... 82
Salisbury, report on water supply..... 83
Sanbornton, report on water supply..... 83
Sandown, report on water supply..... 83
Sandwich, report on water supply..... 83
water supply, petition from board of health..... 128

Sanitary Bulletin vii
Sausage, standard 247
Seabrook, report on water supply..... 83
Selectmen, boards of, cannot discharge health officers..... vi
Sewerage of Alton and Alton Bay..... 101
Sharon, report on water supply..... 83
Shelburne, report on water supply..... 83
Sickness from suspected milk..... 134
Soda waters, report on examinations of..... 145
Somersworth, report on water supply..... 83
Special Reports on Water Supplies, Typhoid Fever, etc..... 99
Spices, report of examinations of..... 177
standard 247
Springfield, report on water supply..... 85
Sputum examinations 225
Squam Lakes, summer camps about..... 131
water supply opinion of Attorney-General concerning 130
protection of 128
regulations of state board of health for..... 132
Stewartstown, report on water supply..... 85
Stoddard, report on water supply..... 85
Strafford, report on water supply..... 85
Stratford, report on water supply..... 85
Stratham, report on water supply..... 86
Sugar, standard 247
maple, law regarding 239
report on examinations of..... 163
Sullivan, report on water supply..... 86
Sulphurous Acid and the Sulfites; Food Preservatives..... 189
in dried fruit..... 157
in grams of confectioner's glucose..... 152
Sunapee, report on water supply..... 86
Sutton, report on water supply..... 87
Swanzey, report on water supply..... 87
Tamworth, report on water supply..... 87
Tannin in Coffee, by C. D. Howard..... 186
Tea, standard 247
Temple, report on water supply..... 87
Tilton, report on water supply..... 88
Thornton, report on water supply..... 88
Troy, report on water supply..... 88
Tuberculosis, sputum examinations for..... 221
(See Consumption.)
Tuftonborough, report on water supply..... 88
Typhoid fever xvi
care of 278
cause of 275

Typhoid fever, deaths from 274
by age periods 274
months 275
disinfectants 280
duties of boards of health..... 279
examinations for 233
how germs of are scattered..... 277
how it is spread..... 276
quarantine unnecessary..... 280
Typhoid Fever and the Water Supply of Berlin..... 110
Typhoid Fever: Its Prevalence, Cause, Restriction and Prevention.. 273
Typhoid-infected well at West Canaan..... 123
Unity, report on water supply..... 88
Vanilla extract, report on examinations of..... 178
Vinegar, cider, law regarding..... 239
report on examinations of..... 180
standard 247
Vital statistics viii
Wakefield, report on water supply..... 88
Walpole, report on water supply..... 89
Warner, report on water supply..... 89
Warren, report on water supply..... 90
Washington, report on water supply..... 91
Waste, disposal of household..... xvi
Water analysis, special notice in regard to..... 7
summary of results..... 8
Water supplies (See individual towns).
examination of 3–97
private, notice concerning examination of..... 6
public and private..... xiii
Water Supplies of Towns and Cities..... 1
Waterville, report on water supply..... 91
Weare, report on water supply..... 91
Webster, report on water supply..... 91
Wentworth, report on water supply..... 91
Westmoreland, report on water supply..... 91
Whitefield, report on water supply..... 91
Wilmot, report on water supply..... 92
Wilton, report on water supply..... 92
Winchester, report on water supply..... 94
Windham, report on water supply..... 94
Windsor, report on water supply..... 94
Wolfeborough, report on water supply..... 95
Woodsville, report on water supply..... 96
Woodstock, report on water supply..... 95

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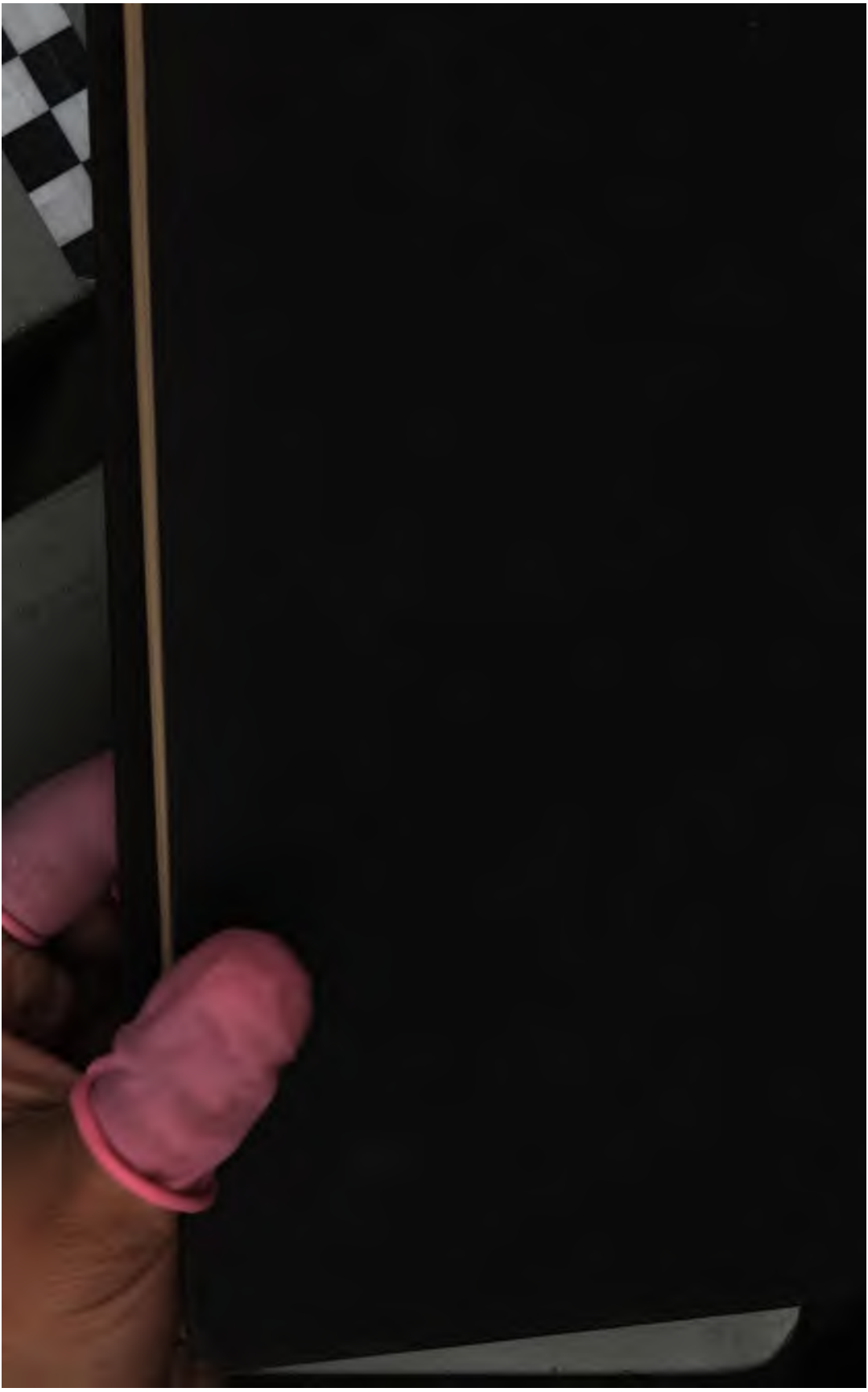
v.19 Report. 97421
1905/06

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